

**Fishery Data Series No. 14-24**

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# **Deshka River Chinook and Coho Salmon Escapement Studies, 1995–2004**

by

**Sam S. Ivey**

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May 2014

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	Alaska Administrative Code	AAC	all standard mathematical signs, symbols and abbreviations	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H <sub>A</sub>
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	<i>e</i>
hectare	ha			catch per unit effort	CPUE
kilogram	kg			coefficient of variation	CV
kilometer	km	at compass directions:	@	common test statistics	(F, t, $\chi^2$ , etc.)
liter	L			confidence interval	CI
meter	m			correlation coefficient	
milliliter	mL	east	E	(multiple)	R
millimeter	mm	north	N	correlation coefficient (simple)	r
<b>Weights and measures (English)</b>		south	S	covariance	cov
cubic feet per second	ft <sup>3</sup> /s	west	W	degree (angular )	°
foot	ft	copyright	©	degrees of freedom	df
gallon	gal	corporate suffixes:		expected value	<i>E</i>
inch	in	Company	Co.	greater than	>
mile	mi	Corporation	Corp.	greater than or equal to	≥
nautical mile	nmi	Incorporated	Inc.	harvest per unit effort	HPUE
ounce	oz	Limited	Ltd.	less than	<
pound	lb	District of Columbia	D.C.	less than or equal to	≤
quart	qt	et alii (and others)	et al.	logarithm (natural)	ln
yard	yd	et cetera (and so forth)	etc.	logarithm (base 10)	log
<b>Time and temperature</b>		exempli gratia		logarithm (specify base)	log <sub>2</sub> , etc.
day	d	(for example)	e.g.	minute (angular)	'
degrees Celsius	°C	Federal Information Code	FIC	not significant	NS
degrees Fahrenheit	°F	id est (that is)	i.e.	null hypothesis	H <sub>0</sub>
degrees kelvin	K	latitude or longitude	lat or long	percent	%
hour	h	monetary symbols		probability	P
minute	min	(U.S.)	\$, ¢	probability of a type I error	
second	s	months (tables and figures): first three		(rejection of the null hypothesis when true)	$\alpha$
<b>Physics and chemistry</b>		letters	Jan,...,Dec	probability of a type II error	
all atomic symbols		registered trademark	®	(acceptance of the null hypothesis when false)	$\beta$
alternating current	AC	trademark	™	second (angular)	"
ampere	A	United States		standard deviation	SD
calorie	cal	(adjective)	U.S.	standard error	SE
direct current	DC	United States of America (noun)	USA	variance	
hertz	Hz	U.S.C.	United States Code	population sample	Var var
horsepower	hp				
hydrogen ion activity (negative log of)	pH				
parts per million	ppm	U.S. state	use two-letter abbreviations		
parts per thousand	ppt, ‰		(e.g., AK, WA)		
volts	V				
watts	W				

***FISHERY DATA SERIES NO. 14-24***

**DESHKA RIVER CHINOOK AND COHO SALMON ESCAPEMENT  
STUDIES, 1995–2004**

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## ABSTRACT

Chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*O. kisutch*) escapements to the Deshka River were assessed from 1995 to 2004 to provide escapement counts and stock-specific biological information. Both Chinook and coho salmon were counted at a weir operated from late May through mid-September each year. The mean annual Chinook salmon weir count was 31,257 fish. Age composition for Chinook salmon averaged 27.1% age-1.2 fish, 52.5% age-1.3 fish, and 19.4% age-1.4 fish. On average, females composed 49.2% of the runs. Chinook salmon run timing was consistent each year with 50% (SE 3.6%) of the fish passing upstream of the weir by 18 June. A simple linear regression model was used to describe the relationship between Chinook salmon aerial escapement index counts and weir counts ( $R^2 = 0.9325$ ,  $n = 6$ ). Chinook salmon escapement goals were met during 1997–2004. The mean annual coho salmon weir count was 26,241 fish. Above average runs were observed during 2000–2002 and 2004. High water events precluded complete coho salmon weir counts 4 of the 10 years. Rebound from below-average runs counted in 1997 and 1999 was observed in 2001 and 2003. Mean annual coho salmon age composition was 32.3% age-1.1 and 66.5% age-2.1. On average, females composed 45.4% of the runs. Coho salmon run timing was inconsistent (SE = 13.7% at mean 50th percentile).

Key words: Deshka River, Chinook salmon, *Oncorhynchus tshawytscha*, coho salmon, *Oncorhynchus kisutch*, resistance board weir, weir count, aerial index, escapement, age composition, mean length-at-age.

## INTRODUCTION

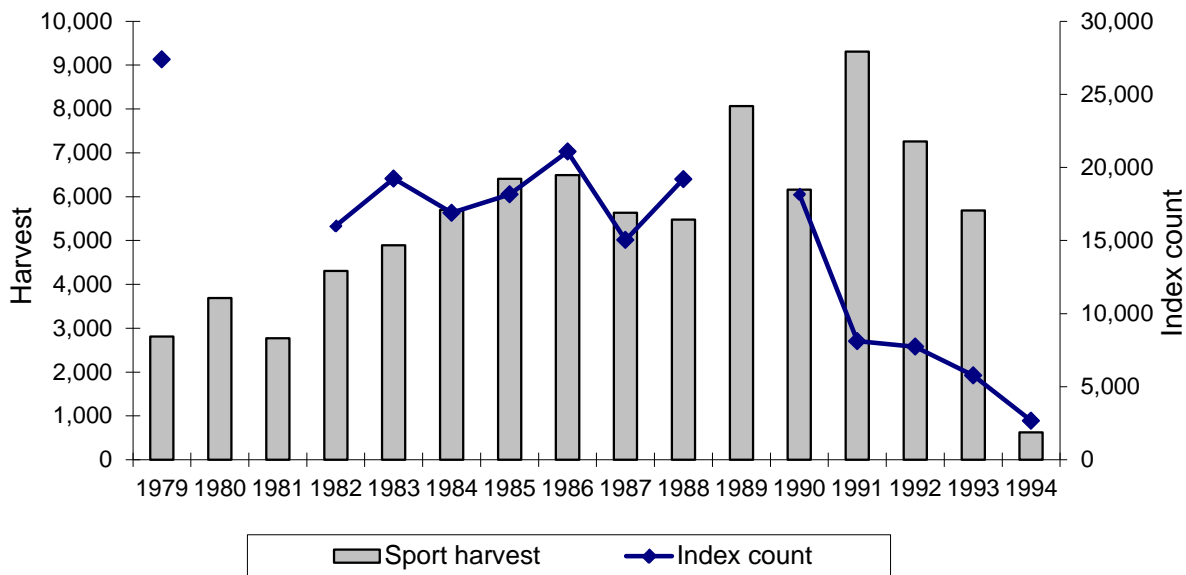
The Deshka River has the highest escapements of Chinook salmon (*Oncorhynchus tshawytscha*) in the Northern Cook Inlet Management Area (NCIMA) (Ivey and Sweet 2004) and has historically supported the largest wild Chinook salmon sport fishery (Mills 1979–1980, 1981a–b, 1982–1994; Howe et al. 1995–1996, 2001 a–d; Walker et al. 2003; Jennings et al. 2004, 2006a–b, 2007). The mean escapement index count from 1979 to 1993 was 16,063 fish and the mean sport harvest was 5,642 fish. Between 1991 and 1994, Chinook salmon index counts declined throughout NCIMA streams, particularly those in the Susitna River drainage (Whitmore et al. 1995). The index count in the Deshka River dropped from 18,166 in 1990 to 8,112 in 1991—below the Biological Escapement Goal (BEG) of 11,200 fish—and continued downward through 1994 (Figure 1). The Deshka River sport harvest peaked in 1991 at 9,306 fish, which is 66% greater than the previous 10-year average, then declined in later years until emergency order (EO) closure in midseason 1994 (Figure 1). Added restrictions implemented in 1995 on select NCIMA Chinook fisheries, including the Deshka River (Appendix A1), were intended to reduce the harvest level by half that of the prior season (Whitmore et al. 1996). The Deshka River remained closed to Chinook salmon fishing by regulation in 1995.

To address concerns about declining Susitna River Chinook salmon stocks, a weir study was initiated in 1995 on the Deshka River. The short-term project objectives were to monitor Chinook salmon escapement for inseason management purposes, to determine the accuracy and consistency of the aerial escapement index counts, and to develop age composition productivity models. The long-range objectives were to estimate sustainable yield and establish a BEG. Yanusz (*In prep*)<sup>1</sup> addresses Chinook salmon productivity from 1977 to 2003 and provides an estimate of maximum sustainable yield (MSY). Data presented in Yanusz (*In prep.*) was used to develop the existing BEG (Bue and Hasbrouck *Unpublished*)<sup>2</sup>. The Chinook salmon portion of this report focuses on weir operations, weir counts, the aerial index–weir count relationship, and biological data from 1995 to 2004.

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<sup>1</sup> Yanusz, R. In prep. Productivity of the Deshka River Chinook salmon stock during 1974 to 2001. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.

<sup>2</sup> Bue, B. G., and J. J. Hasbrouck. *Unpublished*. Escapement goal review of salmon stocks of Upper Cook Inlet. Alaska Department of Fish and Game, Report to the Alaska Board of Fisheries, November 2001 (and February 2002), Anchorage.



*Aerial index count sources:* Kubik and Wadman 1978-1979 (for data years 1977–1978); Kubik and Delaney 1980 (1979); Delaney and Hepler 1983 (1980–1982); Hepler and Bentz 1984-1987 (1983–1986); Hepler et al. 1988-1989 (1987–1988); Sweet and Webster 1990 (1989); Sweet et al. 1991 (1990); Whitmore et al. *Unpublished*<sup>3</sup> (1991-1992); Whitmore et al. 1994-1995 (1993–1994).

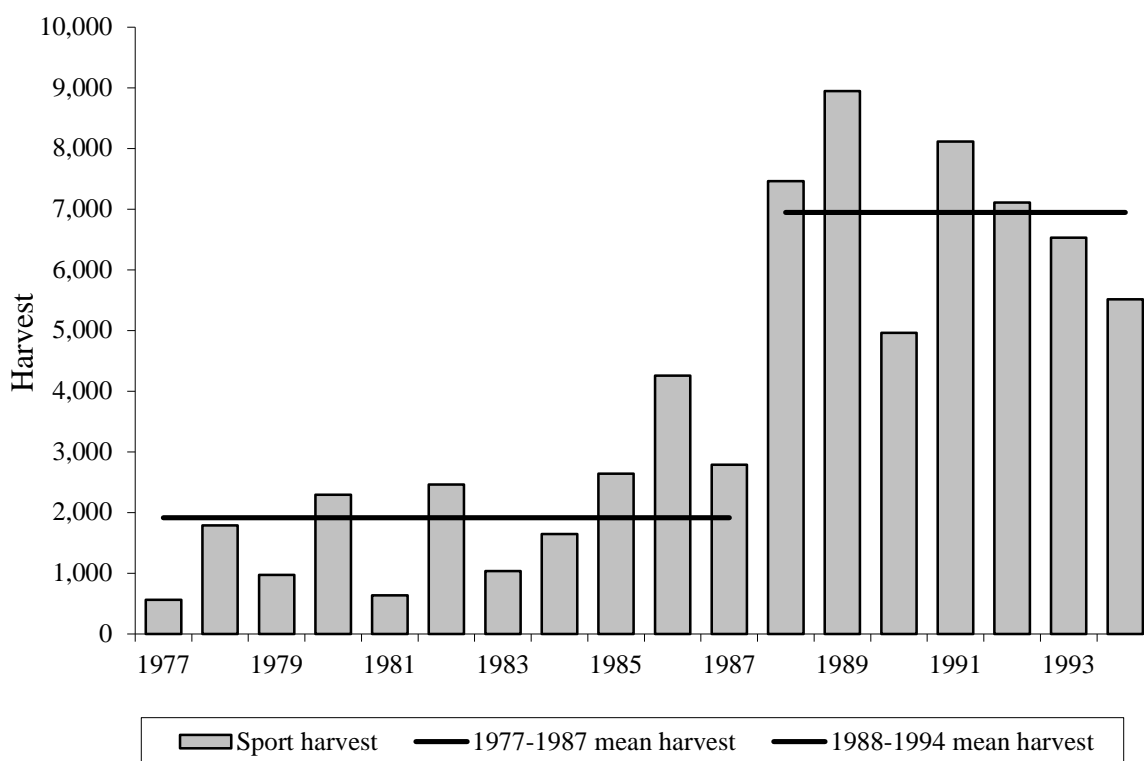
*Deshka sport harvest sources:* Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995.

Figure 1.—Deshka River Chinook salmon sport harvest and escapement index counts, 1979–1994.

The Deshka River also supports the highest average sport harvest of coho salmon (*O. kisutch*) among the Westside Susitna River drainages in the NCIMA (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995-1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b). The mean sport harvest for 1977-1987 was 1,915 (Figure 2). From 1988 to 1994, mean harvest was 6,947 and peaked at 8,947 in 1989. Deshka River coho salmon were not counted by index previously, and no escapement goals were ever formulated. The potential for large harvests and a lack of stock-specific information needed to develop management strategies for streams in the Westside Susitna River drainage were the primary reasons for including coho salmon in the weir study. The Chinook salmon weir, already in place, allowed a practical means of monitoring coho salmon escapement. The coho salmon portion of this report focuses on weir operations, weir counts, and biological data collected from 1995 to 2004. Coho salmon counts and age, sex, and length (ASL) data collected in 1995 are also reported in Bartlett (1996).

The annual objectives for the Chinook and coho salmon project were to 1) count the number of adult Chinook and coho salmon in the Deshka River that pass through the weir from late May to mid-September and 2) estimate the age and sex composition and mean length-at-age of adult Chinook and coho salmon.

<sup>3</sup> Whitmore, C., D. Sweet, and L. Bartlett. *Unpublished*. Area management report for the recreational fisheries of Northern Cook Inlet, 1992. Located at Alaska Department of Fish and Game, Division of Sport Fish, 333 Raspberry Road, Anchorage.



Sources: Mills 1979-1980, 1981a-c, 1982-1984; Howe et al. 1995.

Figure 2.—Deshka River coho salmon sport harvest, 1977–1994.

## STUDY AREA

The Deshka River headwaters, referred to as Kroto Creek on U.S. Geological Survey (USGS) topographical maps, originate south of a divide between Peters Hills and the Chulitna River and discharge into the west side of the Susitna River 61 river kilometers (RKM) north of Cook Inlet, about 15 km southwest of Willow, Alaska. Moose Creek, a major Deshka River tributary, forms a confluence with Kroto Creek at RKM 48 creating the lower river's mainstem. The lower 48 RKM are generally referred to as the Deshka River and the portion upstream of the Moose Creek confluence is referred to as Kroto Creek (Figure 3). Chijuk Creek at RKM 28 and Trapper Creek at RKM 23 are 2 minor Deshka River tributaries. The river flows about 141 RKM and drains about 153,100 ha of lowland taiga dominated by black spruce muskegs (Meyer et al. 2001), which gives the river a tannin-stained appearance. Swamp grasses comprise the primary debris, and secondary debris is composed of woody vegetation. Average daily summer water temperature ranges from 7°C in mid-May to nearly 19°C in July (Figure 4). In mid-May, spring runoff normally begins at about 4,500 ft<sup>3</sup>/s and decreases to approximately 1,500 ft<sup>3</sup>/s by late May (Scott Lindsey, Alaska-Pacific River Forecast Center, Anchorage, personal communication; Figure 5). Low water levels normally occur from mid to late summer (July–August), and fall (August–September) precipitation can cause high water events. The Chinook salmon sport fishery primarily occurs at the mouth and the first 11 RKM. River access is by airplane or boat, most often at Deshka River or Susitna River landings.

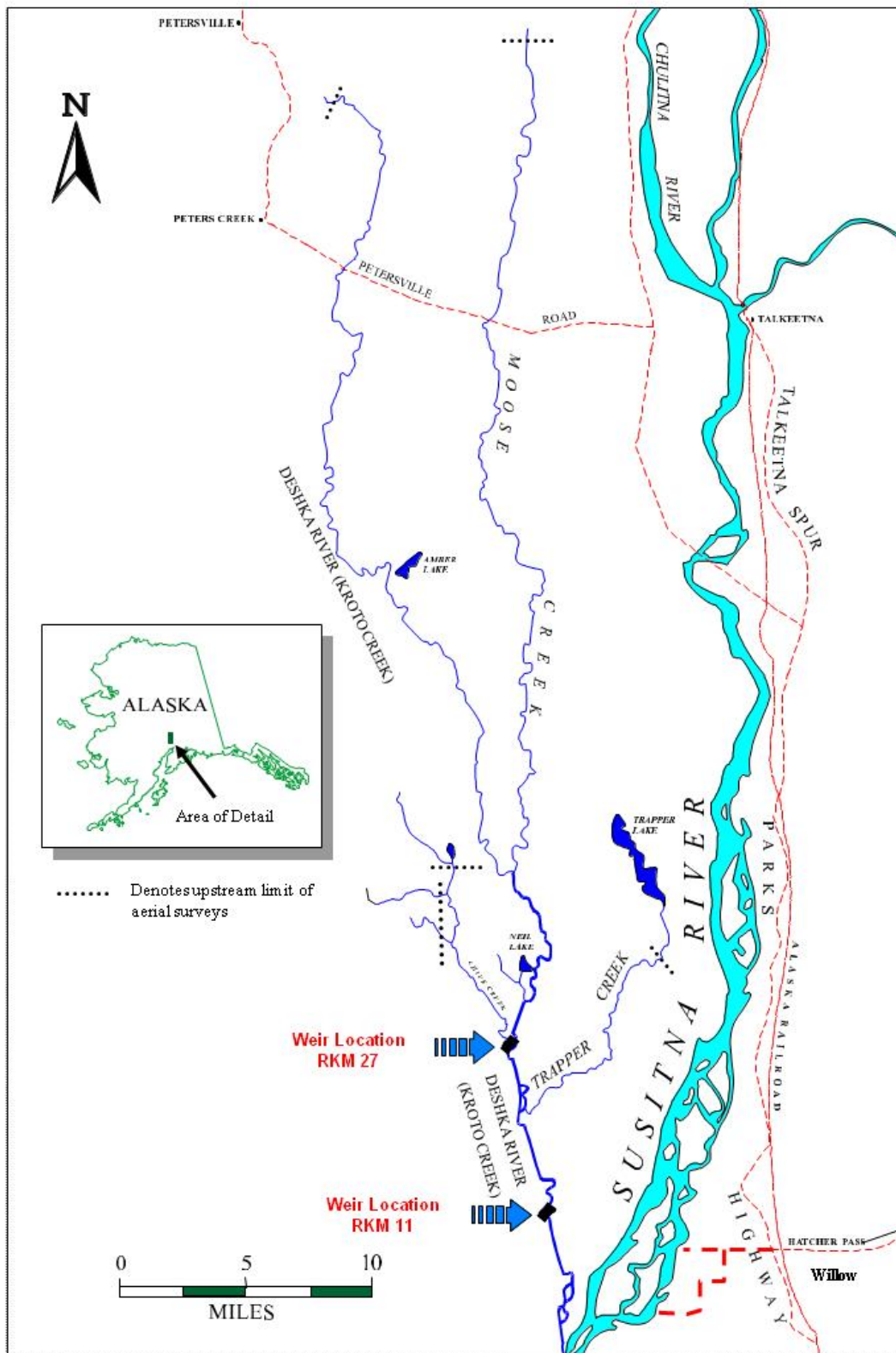


Figure 3.—The Deshka River drainage, weir locations, and aerial survey reaches.

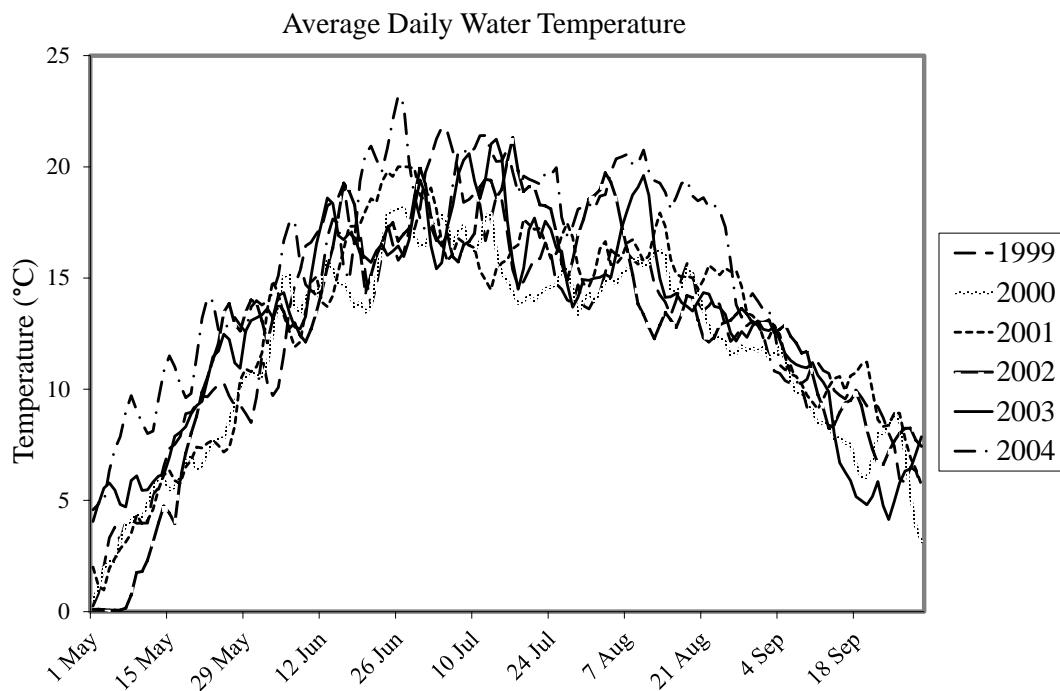
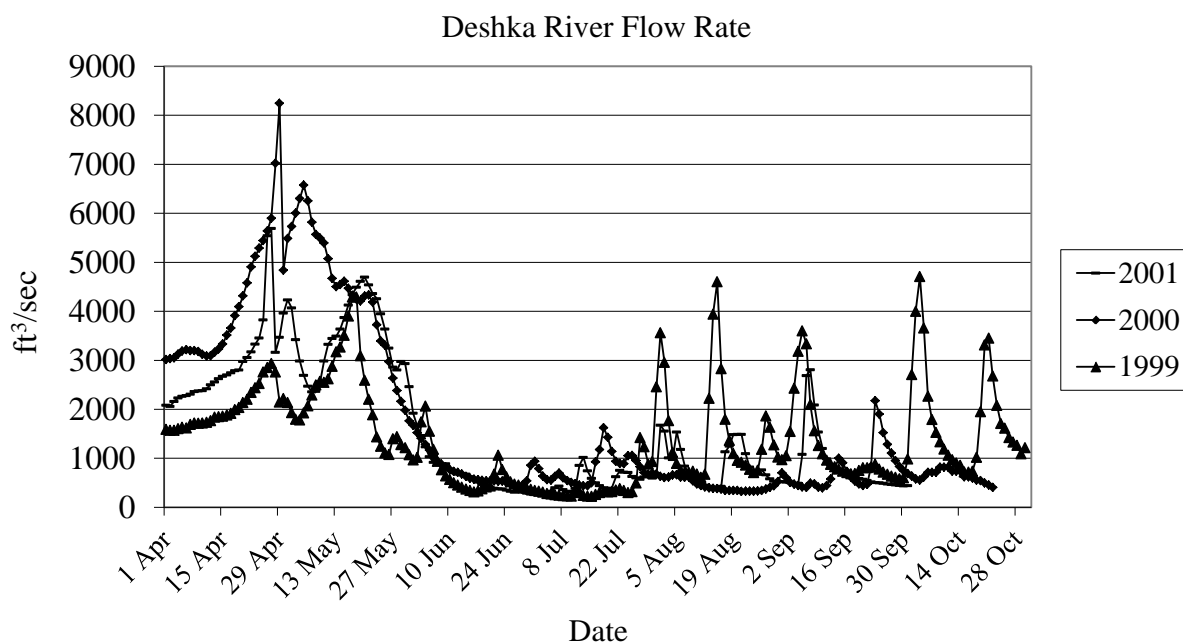


Figure 4.—Average daily water temperature by year for dates weir was operational (1999–2004) recorded by an Optic StowAway Temperature Logger attached to the weir rail, RKM 11 Deshka River.



Source: Bertrand et al. 2000; Meyer et al. 2001-2002.

Note: the USGS gauging station was not operational after 2001.

Figure 5.—Average daily flow rate from 1 April to 31 October for the years 1999–2001 as measured at a USGS hydrological station located at RKM 9.5 of the Deshka River.

The Deshka River supports 5 species of Pacific salmon. The river is known mainly for its high production of Chinook, coho, and pink salmon (*O. gorbuscha*). Sockeye (*O. nerka*) and chum (*O. keta*) salmon compose a small fraction of the total annual salmon return. Resident rainbow trout (*O. mykiss*) also exist. Other species present include Arctic grayling (*Thymallus arcticus*), Dolly Varden (*Salvelinus malma*), burbot (*Lota lota*), round whitefish (*Prosopium cylindraceum*), longnose sucker (*Catostomus catostomus*), threespine stickleback (*Gasterosteus aculeatus*), Arctic lamprey (*Lampetra camtschatica*), and slimey sculpin (*Cottus cognatus*) (Delaney et al. 1981). Northern pike (*Esox lucius*) are not indigenous, but have been documented throughout the Deshka River drainage from illegal introductions to the Susitna River in the early 1950s (Rutz 1996). Occurrence of humpback whitefish (*Coregonus pidschian*) was documented in 2004 (Suzanne Hayes, ADF&G, Palmer, personal communication).

## METHODS

### WEIR SITE

A weir was first installed on the Deshka River at RKM 27 in 1995 (Figure 3). The river width at the RKM 27 weir site was approximately 31 m. It was difficult to maintain the weir at this site because the weir was prone to flooding due to a narrow channel and relatively unstable substrate. In 1997, the weir was moved downstream to RKM 11 where the Deshka River is 53 m wide and the substrate is predominately cobble with some gravel and sand. Discharge and water velocity measurements taken by Alaska Department of Fish and Game (ADF&G) staff on 22 May 2003 are typical for flows in late May and early June (Figure 5): the midriver surface water velocity was 2.4 ft/s, and discharge was 1,445 ft<sup>3</sup>/s (Richard Yanusz, ADF&G, Palmer, personal communication). The maximum water depth as measured along the substrate rail during discharge at 1,445 ft<sup>3</sup>/s was approximately 1.2 m.

### WEIR DESIGN AND OPERATION

A resistance board weir was used to census upstream passage of Chinook and coho salmon from late May through mid-September. The weir was installed after spring runoff subsided to about 1,600–1,900 ft<sup>3</sup>/s, when the weir could be safely assembled. Water discharge was measured at USGS hydrological station 15294100 at Loebb's Homestead (RKM 9.5) from 1978 to 1986 and from 1998 to 2001. The weir installation date (date when river flow rate was likely to be less than 1,600 ft<sup>3</sup>/s) was estimated using flow data recorded at the gauge station against an approximate mean drop in discharge of 350–400 ft<sup>3</sup>/s/day, excluding precipitation. After the gauge station closed in 2001, the weir installation date was estimated from flow measurements taken from the site's reference mark, the high point of a large 1.2 m diameter boulder embedded in the streambed 9 m from the left bank and 61 m downstream of the old gauge site. Using 2–4 scuba divers and 6–8 ground crew, the weir could be assembled and operational within 2 days. Once the weir was operational, daily water level was measured at the weir with a staff gauge.

The Deshka River weir design was a modified Japanese-style resistance board weir engineered by Daishin Kogyo Co., Ltd (distributed by Mitsubishi International Corp., Seattle, WA)<sup>4</sup>. Details of the design may be found in Appendix B1. The weir consisted of 57 panels, each 94 cm (37 in) wide by 6 m (20 ft) long, constructed of 2.5 cm (1 in) diameter schedule 40 polyvinyl chloride (PVC) pickets. Pickets were spaced such that the gaps were at most 3.8 cm (1.5 in) to allow

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<sup>4</sup> Product names used in this publication are included for completeness but do not constitute product endorsement.

census of all salmon except ocean-age-1 Chinook salmon, ocean-age-0 coho salmon, and some pink salmon. A resistance board, set at an angle to the river's flow, created positive lift and buoyancy to the downstream end of each panel.

A gate located midchannel allowed for the upstream and downstream passage of boats over the weir. The last 0.5 m (1.5 ft) of the downstream ends of 4 adjacent panels that comprised the boat gate were angled downward 30 degrees. Two 5 mm (3/16 in) cables attached to the downstream end of the boat gate were threaded through substrate-anchored pulleys, directly below the gate, to a 12-volt battery-operated winch. The winch was mounted and operated from a working platform. The winch was used to pull the gate below the water surface to allow boat passage.

A (2.4 m × 1.2 m × 1.2 m) live trap was positioned on the upstream side of a railroad rail track that was used to anchor the weir. The trap had 2.5 cm (1 in) diameter aluminum tubing spaced such that the gaps were at most 3.8 cm (1.5 in). Two V-shaped wings on the downstream side of the trap could be opened internally to allow fish to pass or be configured to trap fish. Additionally, the trap had 2 sliding doors to allow entrance into and out of the trap. A narrow channel on the exit door allowed for the installation of riser boards when clarity was low; riser boards were used to lift fish so they could be identified while exiting the trap. Because the water depth at the live trap during high water events nearly exceeded the trap height, a 0.6 m (2 ft) trap extension was added, increasing the trap height to 1.8 m (6 ft). The working platform was attached to the side of the trap and supported by a steel tripod on the opposite side.

### **WEIR MODIFICATIONS: 2000–2003**

Five modifications were made to the weir between 2000 and 2003 to increase its performance:

- 1) An adjustable trap door that could be raised or lowered to make it easier to count and identify salmon was installed in 2000. The floor was modified in 2002 to an adjustable-incline floor composed of the upstream half of the trap and hinged to the floor.
- 2) In 2000, an additional stringer was attached to the downstream end of each panel to reduce wobbling of pickets. Before 2000, pickets wobbled severely when inundated during high water events. Pickets became saturated and less buoyant when wobbling caused holes to develop from wear.
- 3) In 2001, the resistance board cable guides were improved to eliminate cable kinking. Weir buoyancy was lost when kinking caused cables to break, and the resistance boards could no longer be held in place at an angle to the water's flow.
- 4) In 2002, wedge-shaped Styrofoam floats coated with epoxy resin were attached to the downstream side of the resistance boards to increase buoyancy during high water events. Only panels likely to be inundated first, such as those located in the channel thalweg, were outfitted with Styrofoam floats.
- 5) In 2003, a sliding door was installed on a rigid section of the weir joining the west bank with the working platform to allow fish identification and passage during high water events.

### **SALMON COUNTS**

Counts of Chinook salmon passing the weir were made from late May through August and counts of coho salmon were made from early July through mid-September, unless flooding made

operating the weir impossible. Hand tally counters were used to count salmon passing through the weir when daylight was sufficient to identify fish species. Sliding doors located on the downstream and upstream sides of the trap were opened to allow fish passage during daylight hours. When needed, the trap floor was adjusted or riser boards were added to raise fish to a level adequate for identification and counting. The trap doors were closed when no fish were present downstream from the weir or at the end of daylight hours. Other fish that passed through the weir were also identified to species and counted.

## AGE, SEX, AND LENGTH

From 1995 to 2001, age, sex, and length (ASL) sample size goals for both Chinook and coho salmon were set before each season based on a multinomial sampling design. From 2002 to 2004, the coho salmon ASL sampling goal was based on a binomial design because 99% of the escapements prior to 2002 were composed of only 2 age classes: age-1.1 and age-2.1 fish. Both Chinook and coho salmon ASL samples were collected in proportion to predicted run timing. In 1995, the coho salmon ASL sampling goal from the Little Susitna weir was applied to the Deshka River weir because no coho salmon escapement estimates were available (Bartlett 1996). Chinook salmon sampling was spread approximately equally among predicted run timing quartiles. Fish for ASL sampling were obtained by letting them enter the trap on their own through the downstream door until an appropriate number had entered. The downstream door was then closed and, to prevent any selectivity due to human or fish behavior, all fish in the trap were sampled.

External morphological features (kype development or a protruding ovipositor) were used to identify sex. Lengths from mid eye to tail fork (METF) were measured to the nearest 5 mm. Three scales from each fish were taken from a preferred area midway on a diagonal line between the posterior insertion of the dorsal fin and the anterior insertion of the anal fin, 2 rows above the lateral line (Scarnecchia 1979). Scales were mounted directly on gum cards in the field, and then thermo-hydraulically pressed into cellulose acetate to make impressions as described by Clutter and Whitesel (1956). Scale impressions were magnified by a microfiche reader and ages determined by identifying annuli. Age, sex, and length were recorded on standardized age, weight, and length (AWL) version 1.1 mark-sense forms as outlined in Heineman *Unpublished*,<sup>5</sup> and archived at the Alaska Dept. of Fish & Game (ADF&G), Division of Sport Fish (SF), Research and Technical Services (RTS) unit, 333 Raspberry Rd, Anchorage, AK 99518.

Sampling rates among quartiles of the run's cumulative empirical distribution were compared. Equal sampling rates among quartiles indicate that the run was sampled in proportion to the number of fish passing the weir. If the run was sampled in proportion to fish passage, estimates and associated variances of the proportion by age and sex class  $z$  for the escapement ( $\hat{p}_z$ ), and number of fish by age and sex class ( $\hat{N}_z$ ) were calculated per equations (1) to (4) using the grouped data (i.e., not stratifying on run quartiles).

If sampling was not proportional to fish passage, then age and sex proportions were tested for independence of run time. If a chi-square test for independence was not rejected ( $P \geq 0.05$ ), then age and sex proportions were considered constant over the run, and the grouped data were used,

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<sup>5</sup> Heineman, G. *Unpublished*. Instructions for Using Sport Fish Creel and Biological Mark-sense Forms, 1991. Alaska Department of Fish and Game, Special Publication, Anchorage.



as described above. If the test was rejected ( $P \leq 0.05$ ), then the proportion by age and sex of the Chinook salmon escapement was estimated as follows:

$$\hat{p}_{tz} = \frac{n_{tz}}{n_t} \quad (1)$$

where  $\hat{p}_{tz}$  equals the estimated proportion of Chinook salmon passing the weir during sampling stratum  $t$  from age and sex category  $z$ ,  $n_{tz}$  equals the number of fish sampled during sampling stratum  $t$  that were classified as age and sex category  $z$ , and  $n_t$  equals the number of Chinook salmon sampled for age and sex during sampling stratum  $t$ .

The variance of  $\hat{p}_{tz}$  was calculated as follows:

$$\hat{V}[\hat{p}_{tz}] = \left(1 - \frac{n_t}{N_t}\right) \frac{\hat{p}_{tz}(1 - \hat{p}_{tz})}{n_t - 1} \quad (2)$$

where  $N_t$  is the number of Chinook salmon passing the weir during sampling stratum  $t$ .

The estimates of escapement by age and sex categories in each sampling stratum were calculated by expansion of  $\hat{p}_{tz}$  by the escapement during sampling stratum  $t$  (i.e.,  $N_t$ ), as follows:

$$\hat{N}_{tz} = N_t \hat{p}_{tz} \quad (3)$$

with its variance estimated as

$$\hat{V}[\hat{N}_{tz}] = N_t^2 \hat{V}[\hat{p}_{tz}]. \quad (4)$$

The total escapement (abundance) by age and sex category and its variance were then estimated by the summations

$$\hat{N}_z = \sum_{t=1}^L \hat{N}_{tz} \quad (5)$$

and

$$\hat{V}[\hat{N}_z] = \sum_{t=1}^L \hat{V}[\hat{N}_{tz}] \quad (6)$$

where  $L$  equals the number of sampling strata.

Finally, the total proportion of the escapement by age and sex and its variance were estimated as follows:

$$\hat{p}_z = \frac{\hat{N}_z}{N} \quad (7)$$

and

$$\hat{V}[\hat{p}_z] = \frac{\hat{V}[\hat{N}_z]}{N^2}. \quad (8)$$

If the stratified estimates were not substantially different from the pooled estimates, then the pooled estimates were used.

Estimates of mean length-at-age for Chinook and coho salmon sampled from the escapement were also calculated. The procedures outlined by Sokal and Rohlf (1981, Boxes 4.2 and 7.1, pages 56 and 139) were used to obtain the estimates of each mean and its standard error.

## **RESULTS**

### **WEIR DESIGN AND OPERATION**

During the years 1995-2004, the mean weir installation date was May 28 (Table 1). The earliest weir installation date was 20 May in 2004, and the latest, because of high water, was halfway through the Chinook salmon run on 16 June in 1998 (Table 1). The Deshka River weir was completely inundated 5 out of 10 years during part of the coho salmon run because of high flow events (Table 2). The highest flow event occurred at RKM 27 in 1996, when the weir was completely submerged on 28 July and not recovered until 29 days later (Appendix C2). In addition to submerging the weir in 1996, high water caused substantial substrate scouring below the rail and trap. Because of the unstable substrate at RKM 27, the weir was relocated to RKM 11 in 1997. The site at RKM 11 had relatively stable substrate and provided easier access.

Based upon observations made during a high water event on 7 September 2001 (Figure 6), the weir was not completely operational at flows greater than 2,800 ft<sup>3</sup>/s at RKM 11 because of poor water visibility and the possibility of fish passing over inundated weir panels. However, based on observation, the Deshka River weir was operational at discharges less than 2,800 ft<sup>3</sup>/s. The weir performed at discharges near 3,000 ft<sup>3</sup>/s only when minimal debris was present, such as the backside of a high water event when the water was clearing. Complete submersion of the boat gate panels occurred at flows of 2,800 ft<sup>3</sup>/s, which corresponds to the water level at the bottom of the sampling platform (top of the trap without the extension). At flows greater than 2,800 ft<sup>3</sup>/s, other areas of the weir began to submerge, depending on debris load. On the Deshka River, grasses, woody debris (e.g., beaver cuttings and large trees), and salmon carcasses accounted for most of the debris during high water events. The amount of debris was dependent on the magnitude of the high water and antecedent flow events. Grasses were the most problematic because their accumulation on weir panels blocked passage of water through the pickets, leading to damming and resistance board failure. Eventually, more water flowed over panels, thereby deflecting them downward. Excess drag from accumulation of grasses on boat gate cables also contributed to submersion. The flows described above are approximate values and describe weir function under typically encountered conditions. Short duration or moderate flow events occurring early in the season are not uncommon (Figure 5). These lesser events are important for removing river debris upstream of the weir. The absence of intermediate flow events before a high water event may lead to submersion of the weir at discharges less than 2,800 ft<sup>3</sup>/s.

Table 1.—Chinook salmon weir counts, run timing, and dates of weir installation on the Deshka River, 1995–2004.

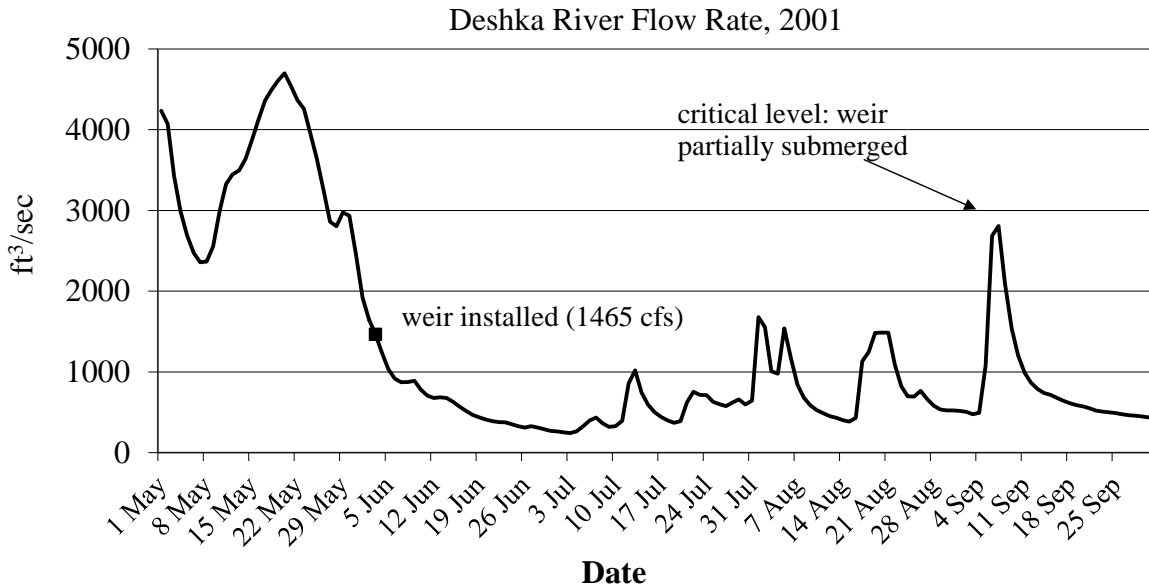
Year	Installation date	Weir counts	Quartile ending dates			
			25%	50%	75%	98%
1995	21 May	10,048	18 Jun	20 Jun	29 Jun	11 Aug
1996	23 May	14,349	11 Jun	16 Jun	22 Jun	17 Jul
1997	28 May	35,587	10 Jun	14 Jun	19 Jun	16 Jul
1998	16 Jun	15,409 <sup>a</sup>				
1999	29 May	29,649	12 Jun	18 Jun	22 Jun	13 Jul
2000	1 Jun	35,242	13 Jun	19 Jun	27 Jun	16 Jul
2001	4 Jun	29,004	11 Jun	21 Jun	2 Jul	12 Jul
2002	30 May	29,428	12 Jun	20 Jun	27 Jun	18 Jul
2003	22 May	40,069	11 Jun	16 Jun	22 Jun	8 Jul
2004	20 May	57,934	11 Jun	17 Jun	1 Jul	12 Aug
Mean <sup>b</sup>	28 May	31,257	11 Jun	18 Jun	26 Jun	16 Jul
SE			1.36%	3.58%	4.38%	0.63%

<sup>a</sup> Count is incomplete.<sup>b</sup> Weir count mean includes complete count years; run time mean excludes the years 1995–1996 (weir at RKM 27) and 1998.

Table 2.—Deshka River weir operations, 1995–2004.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
RKM	27	27	11	11	11	11	11	11	11	11
Date installed	21 May	23 May	28 May	16 Jun <sup>a</sup>	29 May	1 Jun	4 Jun	30 May	22 May	20 May
Dates submerged <sup>b</sup>	25–29 May	28 July	2 Sep	8–12 Aug 23–25 Aug	3 Jun 31 Jul–2 Aug 14–17 Aug		6–7 Sep	9–14 Aug 22–25 Aug	17–19 Aug	
Chinook run <sup>c</sup>	0	0	0	12	0	0	0	0	0	0
Coho run <sup>d</sup>	0	29 <sup>e</sup>	0	8	8	0	0	10	3	0
Date pulled	after 4 Sep	after 28 Jul	9 Sep	7 Sep	27 Aug <sup>f</sup>	14 Sep	13 Sep	9 Sep	8 Sep	9 Sep

<sup>a</sup> Flooding delayed weir installation until halfway through the Chinook salmon run.<sup>b</sup> Dates weir was submerged after installation.<sup>c</sup> Number of days weir was submerged during the Chinook salmon run (4 June–11 July). Dates encompass 90% of the run based on 1997 and 1999–2004 average run timing.<sup>d</sup> Number of days weir was submerged during the coho salmon run (22 July–26 August). Dates encompass 90% of the run based on 1997 and 2000, 2001, and 2003 average run timing.<sup>e</sup> Weir inundated on 29 July due to severe flooding and not operational the remainder of the coho salmon run.<sup>f</sup> Weir pulled early due to multiple high water events during the coho salmon run.



Source: Betrand et al. 2000, Meyer et al. 2001, and Meyer et al. 2002.

Note: the USGS gauging station was not operational after 2001.

Figure 6.—Average daily flow rate for 2001 in relation to the critical level under which the Deshka River weir was operational.

## WEIR MODIFICATIONS: 2000–2003

The incline trap floor improved species identification but sometimes interrupted fish passage by partially blocking the trap exit. The addition of the stringer and modification of the resistance cable guides increased the overall durability of the weir. Consequently, fewer picket and resistance cable repairs were needed. The addition of wedge-shaped floats under select panels increased panel floatation. Floats added to panels subject to sinking maintained flotation similar to adjacent panels but provided only a slight increase in weir performance under high water conditions and were more difficult to clear of debris. The alternate fish passage door installed in the rigid section of weir increased fish passage efficiency and identification during high water.

## SALMON COUNTS

### Chinook Salmon

The mean weir count from 1995 to 2004 was 31,257 fish. The minimum count was 10,048 in 1995 (old weir site), and the maximum was 57,934 in 2004. Complete Chinook salmon weir counts were documented each year except 1998 (Tables 1–2, Appendices C1–C10), when the weir was installed halfway through the Chinook salmon run (16 June) because of high water.

### *Run Timing*

Chinook salmon run timing was consistent each year. The mean first quartile (25%, SE 1.4%) was 11 June and ranged from 10 June to 13 June, and the mean midpoint (50%, SE 3.6%) was 18 June. On average, 98% (SE 0.6%) of Chinook salmon passed the weir by 16 July (Figure 7, Table 1). To avoid error in predicting Chinook salmon travel time between RKM 11 and 27 (i.e., the current and old weir sites), data from 1995 and 1996 were excluded from the average run timing estimates.

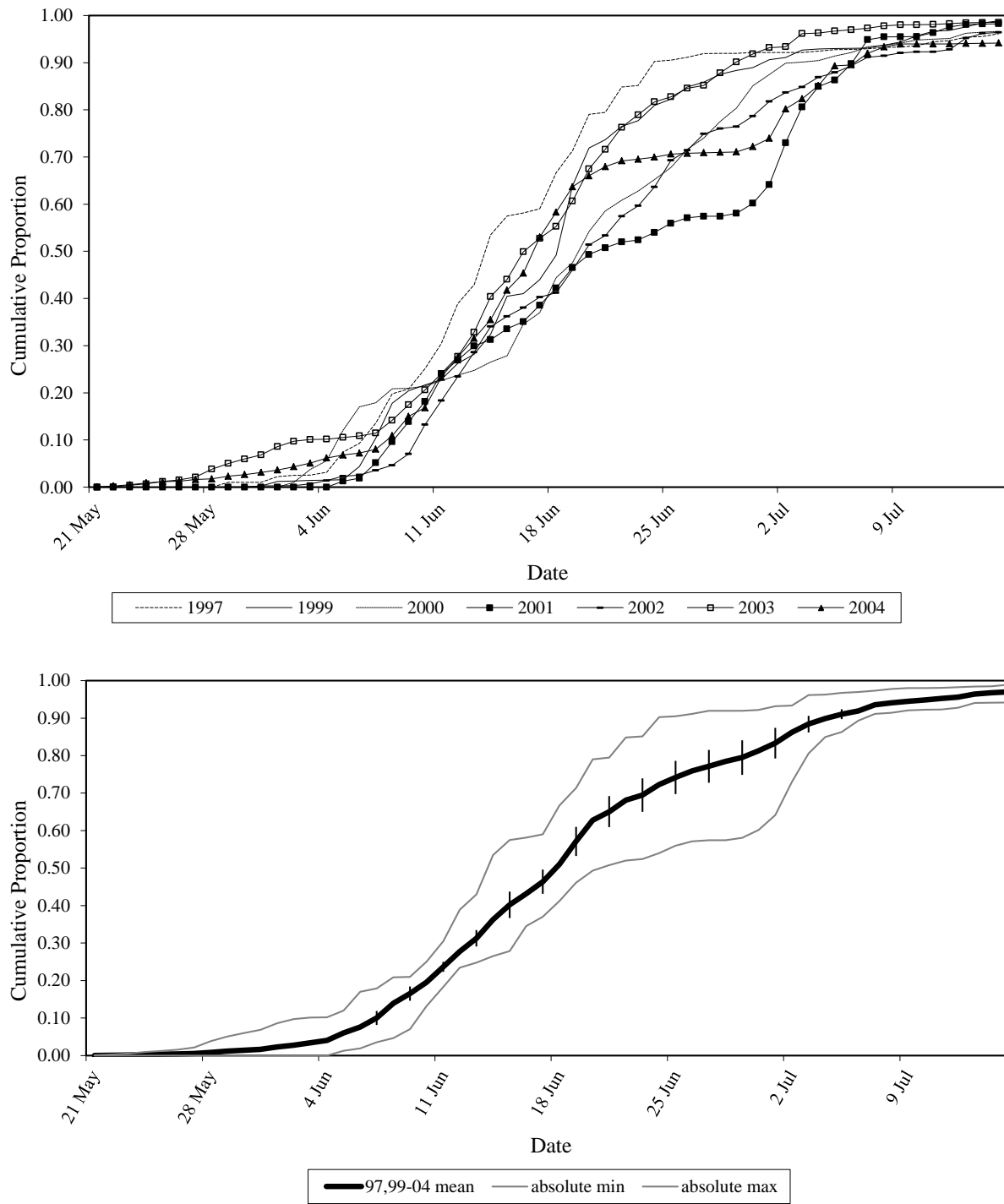


Figure 7.—Cumulative proportion (top) and average and absolute minimum and maximum values, including standard errors (bottom), of Chinook salmon counted passing the Deshka River weir at RKM 11 (complete count years only).

Chinook salmon began moving upstream in the early spring under changing water flows and temperature. Spring runoff usually subsided at the end of May (Figure 5), and water temperatures increased at a near-constant rate of 0.3°C per day until mid-June (Figure 4). The first half of a typical run preceded relatively low water levels and high average water temperatures (Figures 4-5).

Once Chinook salmon migrated upstream from the mouth, their movements became diurnal. Although not recorded, most fish were observed passing through the weir between 4:00 and 6:00 AM and after 5:00 PM, when water temperatures decreased (Appendices D1–D2). Conversely, Chinook salmon passage slowed considerably during daylight hours when water temperatures increased.

### *Aerial Index vs. Escapement*

Aerial index and escapement counts of Chinook salmon were compared for the years 1995–1997, 1999, 2002, and 2004. Comparisons between other years were not possible because aerial surveys were inaccurate due to poor water visibility (Table 3). Observers counted 44.8% of the actual escapement on average, corresponding to a mean expansion factor of 2.2. Because harvest occurred before commencement of the aerial surveys, escapement was regressed against the aerial index to take into account harvest upstream of the weir. The relationship was described by a simple linear regression model  $y = 0.5115x - 1470.3$  ( $R^2 = 0.9325$ ) where  $y$  is the index and  $x$  is escapement determined from the weir count minus the harvest upstream of the weir (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995-1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b) (Figure 8; Appendix E1).

The maximum fitted value of the aerial-weir regression occurred in 2004; the minimum fitted value occurred in 1995 (Figure 8). The 1998 escapement (33,286 fish, SE 7,889) was inversely predicted from the aerial count using the regression model because an incomplete count was observed that year (Table 3).

Table 3.—Comparison of aerial index, escapement, and estimated escapement counts of Chinook salmon during years the Deshka River weir was in operation.

Year	Aerial index <sup>a</sup>	Esc. <sup>b,c</sup>	Aerial index: % actual esc.	Est. esc. <sup>d,e</sup>	Lower 95% CI	Upper 95% CI	Aerial esc. goal	Weir-based esc. goal	Aerial survey water visibility
1995	5,150	10,048	51.3				11,200		normal
1996	6,343	14,349	44.2				11,200		normal
1997	19,047	35,587 <sup>f</sup>	53.5				11,200		excellent
1998	15,556			33,286	17,823	48,748	11,200		poor
1999	12,904	29,088	44.4				8750 <sup>g</sup>	17500 <sup>g</sup>	poor
2000	<sup>h</sup>	33,965					8,750	17,500	
2001	<sup>h</sup>	27,966					8,750	17,500	
2002	8,749	28,535	30.7				<sup>i</sup>	13,000–28,000 <sup>j</sup>	excellent
2003	<sup>h</sup>	39,257						13,000–28,000	
2004	28,778	57,934	49.7					13,000–28,000	excellent
Mean	13,790	30,748	44.8						

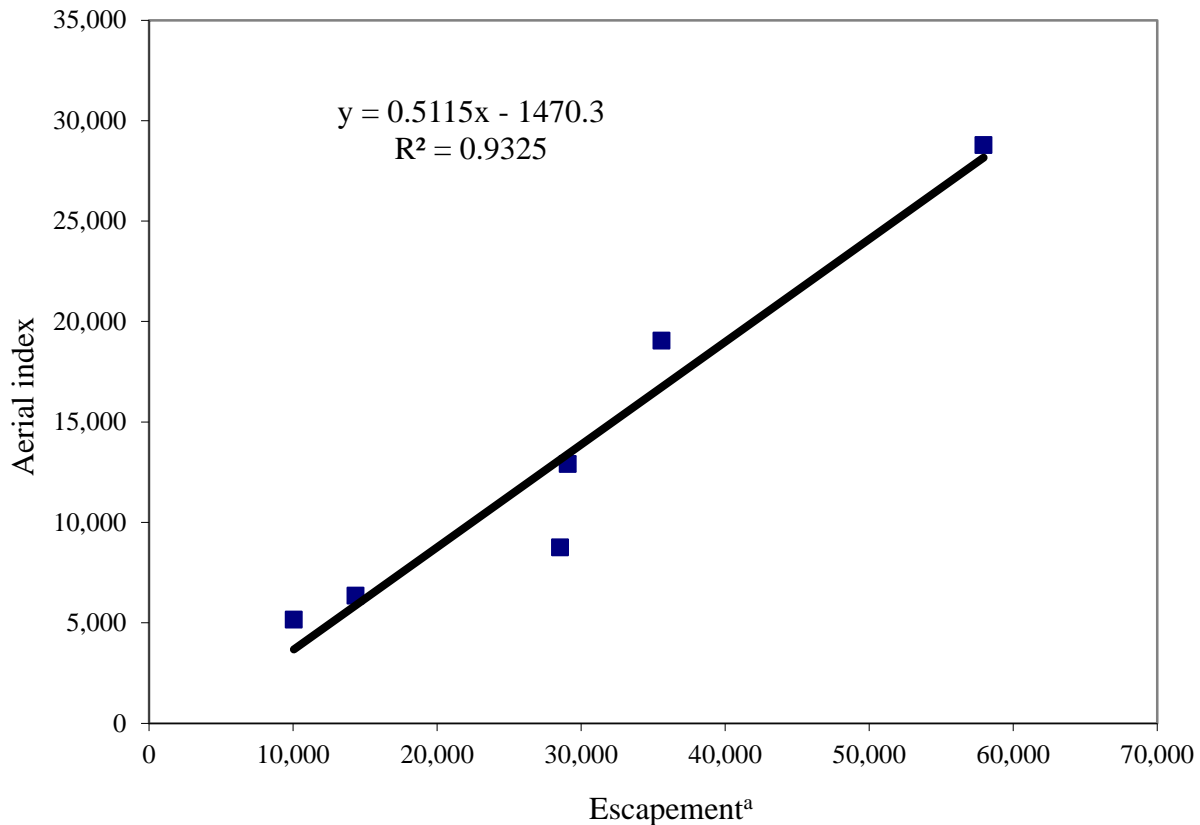
-continued-

Table 3.–Part 2 of 2.

*Aerial count sources:* Whitmore and Sweet 1997-1999 (for data years 1996–1998), Rutz and Sweet 2000 (1999), Sweet and Rutz 2001 (2000), Sweet et al. 2003-2004 (1995, 2001-2003), Ivey and Sweet 2004 (2004).

*Weir count source:* I:SF/INSEASON at Alaska Department of Fish and Game, Division of Sport Fish, Palmer, 1800 Glenn Hwy, Suite 2, Palmer, Alaska.

- <sup>a</sup> Helicopter surveys from mouth of Deshka River to headwaters of Kroto and Moose creeks, including Trapper Creek, Chijuk Creek, and the west fork of Moose Creek.
- <sup>b</sup> Escapement equals weir count minus harvest upstream of the weir as reported to weir staff by anglers fishing upstream of the weir.
- <sup>c</sup> Weir at RKM 27 in 1995–1996 and RKM 11 in 1997–2004.
- <sup>d</sup> Estimated escapement (y) predicted from aerial index counts (x) by linear regression ( $y = 0.5115x - 1470.3$ ,  $R^2 = 0.9325$ ).
- <sup>e</sup> Regression analysis (of years 1995–1997, 1999, 2002, and 2004) was used to incorporate harvest above weir (Howe et al. 1996, 2001a-b,d; Jennings et al. 2006a, 2007).
- <sup>f</sup> Incomplete count. Flooding delayed weir installation until the midpoint of the run on 16 June.
- <sup>g</sup> In 1999, Alaska Board of Fisheries (BOF) lowered the aerial escapement goal and established a weir-based biological escapement goal (BEG).
- <sup>h</sup> No survey because of poor counting conditions.
- <sup>i</sup> Aerial escapement goal was discontinued after 2001.
- <sup>j</sup> In 2002, BOF established a weir-based BEG per Bue and Hasbrouck (*Unpublished*)<sup>6</sup>.



- <sup>a</sup> Escapement equals weir count minus harvest upstream of the weir as measured by the ADF&G statewide harvest survey.

Figure 8.—Simple linear regression of Deshka River Chinook salmon aerial index (y) and weir counts adjusted to incorporate harvest upstream of the weir 1995–2004.

<sup>6</sup> Bue, B. G., and J. J. Hasbrouck. *Unpublished*. Escapement goal review of salmon stocks of Upper Cook Inlet. Alaska Department of Fish and Game, Report to the Alaska Board of Fisheries, November 2001 (and February 2002), Anchorage.

## Coho Salmon

The mean coho salmon weir count from 1995 to 2004 was 26,241 fish (complete count years only). Complete counts ranged from 8,063 in 1997 to 62,940 in 2004 (Table 4) and were recorded 6 of 10 years: 1995, 1997, 2000–2001, and 2003–2004 (Tables 2 and 4). Coho salmon counts in 1996, 1998, 1999, and 2002 were unreliable (incomplete) because of either the severity of a high water event or the timing of a high water event during the coho salmon run. For example, counts from 2002 were unreliable because a high water event, occurring at the average peak of the coho salmon run and lasting for 6 days, resulted in partial inundation of the weir (Table 2). Many coho salmon were observed holding in the lower river (downstream of the weir) before the onset of the high water event. Despite being incomplete, the 2002 weir count of 24,612 fish was near average for completed counts (Table 4). Conversely, the count in 2003 was considered reliable (complete) even though the weir was inundated for 3 days (17–19 August) around the 75th percentile of the average run (17 August) (Tables 2 and 4). This high water event reached peaks on both 15 and 18 August (Appendix F4). The peak water event on 15 August, which coincided with the greatest daily count of coho salmon for that year, did not result in fully submerged weir panels. Because most fish moved upstream during the first peak, few fish were present downstream of the weir during the second peak (18 August), when the weir was partially submerged. In 2002 and 2003, fish were counted through a rigid section of weir near shore during high water. Field notes from 1998 and 2002 indicate that coho salmon swam over a fully inundated weir (Appendices C4 and C8) at flows well above 3,000 ft<sup>3</sup>/s.

Table 4.–Coho salmon weir counts and run timing on the Deshka River, 1995–2004.

Year	Weir counts	Quartile ending dates			
		25%	50%	75%	98%
1995	12,824	3 Aug	8 Aug	15 Aug	31 Aug
1996	1,394 <sup>a</sup>				
1997	8,063	12 Aug	17 Aug	22 Aug	27 Aug
1998	6,773 <sup>a</sup>				
1999	4,566 <sup>a</sup>				
2000	26,387	28 Jul	6 Aug	14 Aug	3 Sep
2001	29,927	4 Aug	6 Aug	16 Aug	31 Aug
2002	24,612 <sup>a</sup>				
2003	17,305	30 Jul	4 Aug	13 Aug	27 Aug
2004	62,940	21 Aug	25 Aug	26 Aug	29 Aug
Mean <sup>b</sup>	26,241	2 Aug	11 Aug	17 Aug	31 Aug
SE		9.63%	13.68%	9.44%	0.52%

<sup>a</sup> Incomplete count.

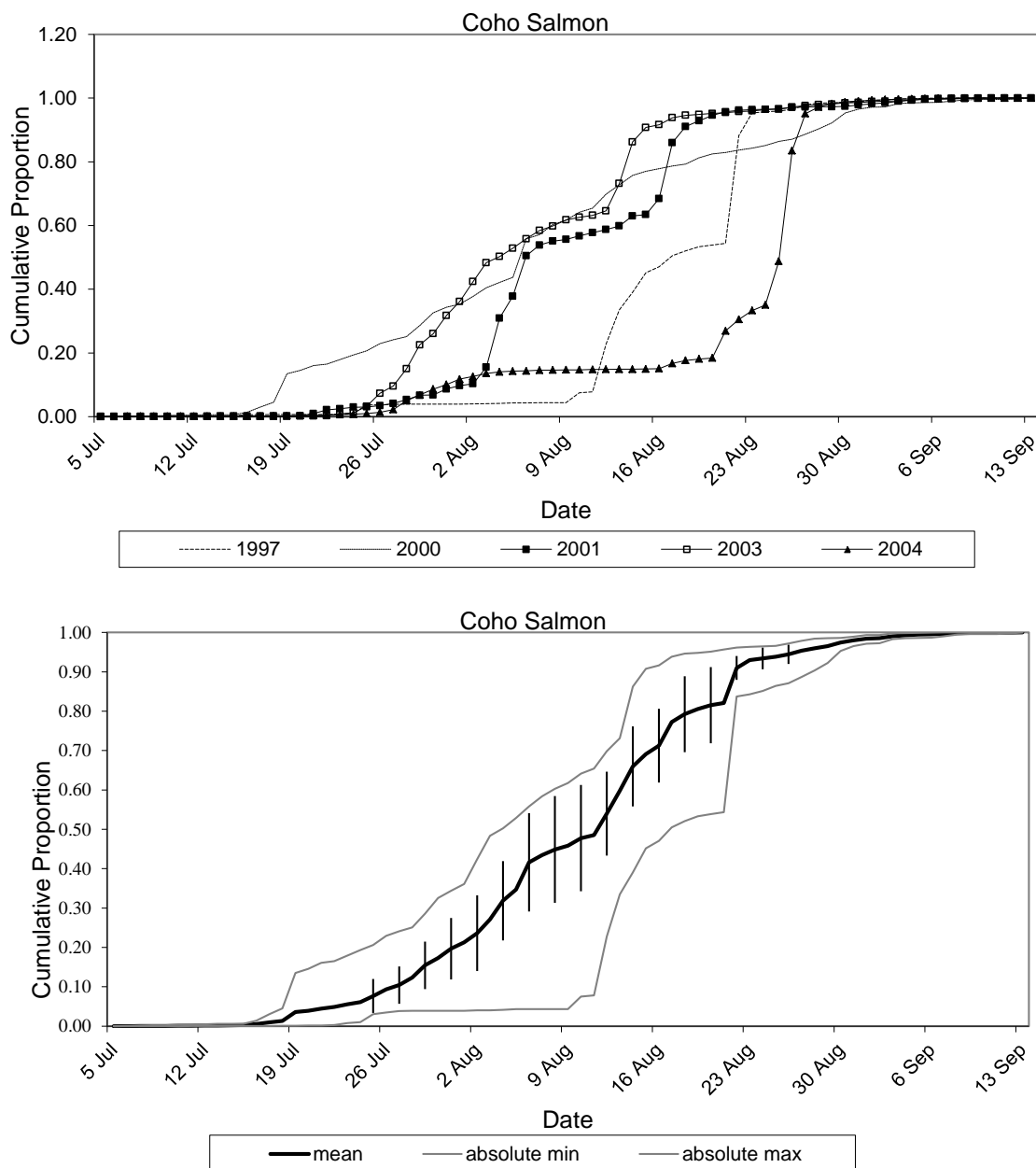
<sup>b</sup> Weir count mean includes complete count years; run time means exclude years 1995–1996 (weir at RKM 27) and 2004 (unusually low water conditions).

### *Run Timing*

In most years, coho salmon began to migrate upstream by late July (Appendices C1–C10). The mean midpoint (50%, SE 13.7%) for run timing was 11 August, with 98% (SE 0.5%) of the fish passing upstream of the weir by 31 August (Table 4 and Figure 9). The earliest run timing occurred in 2003 and the latest in 2004, based upon the midpoint and completion of runs (Figure 9). However, 2004 was excluded from the mean run timing calculation due to extreme hydrological conditions experienced that year. The lowest stage and highest water temperatures were recorded at the weir during 2004 (Figure 4 and Appendix C10).



By mid-June each year, Deshka River water temperatures exceeded 16°C as water levels dropped (Figures 4–5), continuing until about 17 August, at the end of the third quartile of the average run time (Table 4). Observations and passage data indicated the relationship between coho salmon movement, water level, and water temperature. During the coho salmon run, water level spikes normally corresponded to spikes in fish passage. Temperatures generally decreased prior to increases in water stage (Appendices F1–F5).



*Note:* The year 2004 was excluded from mean run timing due to unusually low water levels and high water temperatures experienced throughout most of the 2004 coho salmon run.

Figure 9.—Cumulative proportion (top) and average and absolute minimum and maximum values, including standard errors ( $N = 4$ ) (bottom), of coho salmon counted passing the Deshka River weir at RKM 11 (complete count years only).

## AGE, SEX, AND LENGTH

### Chinook Salmon

Proportional sampling was achieved in 2000, 2002, and 2004. Age-sex proportions were independent of run timing for the years 1998-2000. Unstratified and stratified estimates were nearly identical in 1997, 2001, and 2003; therefore, unstratified data were used to estimate age and sex proportions. Stratified estimates of age and sex proportions were necessary for 1995 and 1996 due to disproportional sampling and a dependence of age on run timing.

The average age composition from 1995 to 2004 was 27.1% age-1.2, 52.5% age-1.3, and 19.4% age-1.4 Chinook salmon, for both sexes combined (Table 5). Female Chinook salmon composed 49.2% of the runs on average annually. Age-1.3 fish dominated Deshka River Chinook salmon escapements. Only in 1996 did age-1.2 fish exceed the proportion of age-1.3 fish (Table 5).

For all age classes combined, for the years 1995–2004, female Chinook salmon METF length ranged from 500 to 1,060 mm and male Chinook salmon METF length ranged from 240 to 1,070 mm. Mean length-at-age of females averaged 611 mm for age-1.2, 790 mm for age-1.3, and 885 mm for age-1.4 fish (Table 6). Mean length-at-age of males averaged 579 mm for age-1.2, 794 mm for age-1.3, and 920 mm for age-1.4 fish.

### Coho Salmon

Proportional sampling was not achieved in any year because of disruptions in sampling (e.g., high water) and large spikes in fish passage. Age-sex proportions were independent of run time in 7 of 10 years ( $P \geq 0.05$ ). Chi-square tests showing dependence between age-sex proportions and run time were significant in 1995 ( $\chi^2 = 19.4$ ,  $df = 9$ ,  $P = 0.0217$ ), 1997 ( $\chi^2 = 19.0$ ,  $df = 9$ ,  $P = 0.0255$ ), and 1999 ( $\chi^2 = 19.3$ ,  $df = 9$ ,  $P = 0.0225$ ). Stratified and unstratified age-sex estimates were similar for all years. Therefore, unstratified age and sex composition estimates were representative of all runs from 1995 to 2004, including 1996 when less than half of the run was counted due to a high water event. The average proportions of age-1.1 and age-2.1 coho salmon were different among years (1995-2004) ( $\chi^2 = 43.3$ ,  $df = 9$ ,  $P < 0.01$ ) due to a low abundance of age-1.1 fish returning in 1999 (Table 7).

Average combined male and female age composition for Deshka River coho salmon from 1995 to 2004 was 66.5% age-2.1 and 32.3% age-1.1 for both sexes combined (Table 7). Female coho salmon composed 45.4% of all runs.

Female coho salmon lengths ranged from 420 to 690 mm METF and male coho salmon from 355 to 710 mm METF (Table 8–9). From 1995 to 2004, mean length-at-age of females averaged 558 mm for age-1.1 and 569 mm for age-2.1 fish (Table 8). Mean length-at-age of males was 558 mm for age-1.1 and 569 mm for age-2.1 fish.

Table 5.—Age composition by sex and age class of Chinook salmon sampled at the Deshka River weir, 1995–2004.

Sex	Year	Age 0.2		Age 1.1		Age 1.2		Age 1.3		Age 1.4		Age 1.5		Age 2.2		Age 2.3		Age 2.4		Total			Total collected	Rejected <sup>a</sup>
		%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	<i>n</i>		
<u>Male</u>																								
	1995 <sup>b</sup>			0.7	0.3	25.8	3.7	17.9	3.6	13.3	2.8	0.3	0.2							58.0	3.5	195		
	1996 <sup>b</sup>	0.1	0.1	0.3	0.3	46.3	2.7	17.7	2.1	4.8	1.1					0.1	0.1			69.2	2.8	275		
	1997			0.2	0.2	15.1	1.6	21.0	1.8	5.7	1.1									42.0	2.2	206		
	1998					28.8	2.5	13.8	1.9	6.9	1.4			0.3	0.3	0.3	0.3	0.3	0.3	50.5	2.8	161		
	1999					29.5	2.2	15.0	1.7	8.9	1.4	0.2	0.2					0.2	0.2	53.8	2.4	241		
	2000					10.7	1.4	30.0	2.1	5.8	1.1									46.6	2.3	217		
	2001			1.5	0.5	22.1	1.8	9.8	1.3	8.8	1.2									42.2	2.1	229		
	2002			1.6	0.5	21.3	1.7	18.5	1.6	7.7	1.1									49.1	2.1	274		
	2003			1.0	0.5	28.7	2.1	18.7	1.8	5.7	1.1									54.1	2.3	264		
	2004			0.9	0.4	14.6	1.5	21.1	1.7	6.4	1.0									43.0	2.1	242		
	Mean	0.1		0.9		24.3		18.3		7.4		0.3		0.3		0.2		0.3		50.8				
<u>Female</u>																								
	1995 <sup>b</sup>					6.4	0.9	18.5	3.6	16.6	2.9	0.5	0.2							42.0	4.1	143		
	1996 <sup>b</sup>							22.4	2.2	8.4	1.5									30.8	4.4	108		
	1997					1.8	0.6	45.0	2.3	11.0	1.4					0.2	0.2			58.0	2.2	285		
	1998							28.2	2.5	21.0	2.3			0.3	0.3					49.5	2.8	158		
	1999					0.9	0.4	28.8	2.1	16.5	1.8									46.2	2.4	207		
	2000							49.1	2.3	4.3	0.9									53.4	2.3	249		
	2001					3.1	0.8	36.5	2.1	18.2	1.7									57.8	2.1	314		
	2002					5.0	0.9	38.0	2.1	7.9	1.1									50.9	2.1	284		
	2003					7.4	1.2	30.1	2.1	8.0	1.2					0.4	0.3			45.9	2.3	224		
	2004					3.7	0.8	45.3	2.1	8.0	1.1									57.0	2.1	321		
	Mean					4.1		34.2		12.0		0.5		0.3		0.3				49.2				

-continued-

Table 5.–Part 2 of 2.

Sex	Year	Age 0.2		Age 1.1		Age 1.2		Age 1.3		Age 1.4		Age 1.5		Age 2.2		Age 2.3		Age 2.4		Total			Total collected	Rejected <sup>a</sup>
		%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	<i>n</i>		
<u>Combined</u>																								
	1995 <sup>b</sup>			0.7	0.3	32.3	3.8	36.4	5.1	29.9	4.1	0.8	0.3							100.0		338	460	122
	1996 <sup>b</sup>	0.1	0.1	0.3	0.3	46.3	2.7	40.1	3.0	13.2	1.9					0.1	0.1			100.0		383	489	106
	1997			0.2	0.2	16.9	1.7	66.0	2.1	16.7	1.7					0.2	0.2			100.0		491	567	76
	1998					28.8	2.5	42.0	2.8	27.9	2.5			0.6	0.4	0.3	0.3	0.3	0.3	100.0		319	376	57
	1999					30.4	2.2	43.8	2.4	25.5	2.1	0.2	0.2					0.2	0.2	100.0		448	527	79
	2000					10.7	1.4	79.2	1.9	10.1	1.4									100.0		466	577	111
	2001			1.5	0.5	25.2	1.9	46.2	2.1	27.1	1.9									100.0		543	710	167
	2002			1.6	0.5	26.3	1.9	56.5	2.1	15.6	1.5									100.0		558	626	68
	2003			1.0	0.5	36.1	2.2	48.8	2.3	13.7	1.6					0.4	0.3			100.0		488	560	72
	2004			0.9	0.4	18.3	1.6	66.4	2.0	14.4	1.5									100.0		563	651	88
	Mean	0.1		0.9		27.1		52.5		19.4		0.5		0.6		0.3		0.3		100.0				

<sup>a</sup> Number of sampled fish with regenerated or inverted scales and scales missing associated sex that were excluded from analysis.

<sup>b</sup> In 1995 and 1996, the age composition was based on weighted data stratified by quartile due to disproportional sampling and a dependence of age on run timing. For all other years, age compositions were based on pooled data for lower variance without bias.

Table 6.—Mean ( $\bar{x}$ ), standard error (SE), maximum, and minimum length-at-age (rounded to nearest mm) and sample size ( $n$ ) by sex and age class of Chinook salmon sampled at the Deshka River weir, 1995–2004.

Year	Age 1.1					Age 1.2					Age 1.3					Age 1.4					Total		
	$\bar{x}$	SE	Min	Max	$n$	$\bar{x}$	SE	Min	Max	$n$	$\bar{x}$	SE	Min	Max	$n$	$\bar{x}$	SE	Min	Max	$n$	$\bar{x}$	SE	$n$
Male <sup>a</sup>																							
1995	438	21	390	490	4	564	5	460	660	94	801	13	605	975	49	936	9	750	1070	45	711	13	194
1996	395		395	395	1	573	4	400	690	185	813	8	630	920	66	932	9	870	1040	21	658	8	275
1997	450		450	450	1	576	6	470	680	74	800	6	590	950	103	896	13	740	1010	28	730	10	206
1998						570	6	410	710	92	792	11	545	970	44	928	10	840	1020	22	684	12	161
1999						597	4	490	710	132	807	9	660	970	67	918	10	755	1010	40	712	9	241
2000						585	8	440	680	50	788	5	630	930	139	879	8	820	960	27	752	8	216
2001	474	9	430	495	8	576	4	470	670	120	811	8	595	910	53	926	6	850	1030	48	715	11	229
2002	393	22	240	470	9	567	5	410	660	119	791	6	570	900	103	927	7	850	1030	43	702	10	274
2003	450	15	410	480	5	580	5	420	690	140	761	7	620	900	91	929	12	810	1040	28	677	8	264
2004	440	11	420	470	5	602	5	470	690	82	776	5	650	940	118	931	11	820	1050	36	733	9	241
Mean	434		391	464		579		444	684		794		610	937		920		811	1026		707		
Female <sup>a</sup>																							
1995						593	8	510	690	34	786	9	600	890	48	888	6	795	1000	58	783	11	143
1996											805	6	600	930	78	899	8	805	980	30	831	6	108
1997						604	16	510	680	9	797	3	610	970	221	867	9	710	980	54	804	4	285
1998											792	5	640	880	90	873	6	740	970	67	826	5	158
1999						660	30	600	705	4	792	4	650	895	129	888	6	780	989	74	824	5	207
2000											780	3	635	900	227	871	12	790	990	20	787	3	247
2001						601	14	510	700	17	798	3	650	915	198	892	4	805	990	99	817	5	314
2002						588	11	500	780	28	791	3	665	900	212	893	7	780	1000	44	787	5	284
2003						609	9	500	700	36	780	5	650	940	147	889	8	810	1060	39	772	7	224
2004						623	11	550	700	21	785	3	670	935	254	891	7	760	1020	44	789	4	319
Mean						611		526	708		790		637	916		885		778	998		802		

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Table 6.–Part 2 of 2.

Year	Age 1.1					Age 1.2					Age 1.3					Age 1.4					Total		
	$\bar{X}$	SE	Min	Max	<i>n</i>	$\bar{X}$	SE	Min	Max	<i>n</i>	$\bar{X}$	SE	Min	Max	<i>n</i>	$\bar{X}$	SE	Min	Max	<i>n</i>	$\bar{X}$	SE	<i>n</i>
Combined <sup>a</sup>																							
1995	438	21	390	490	4	571	4	460	690	128	793	8	600	975	97	909	6	750	1070	103	742	9	337
1996	395		395	395	1	573	4	400	690	185	809	5	600	930	144	912	6	805	1040	51	707	7	383
1997	450		450	450	1	579	6	470	680	83	798	3	590	970	324	876	7	710	1010	82	773	5	491
1998						570	6	410	710	92	792	5	545	970	134	887	6	740	1020	89	754	8	319
1999						599	4	490	710	136	797	4	650	970	196	898	5	755	1010	114	763	6	448
2000						585	8	440	680	50	783	2	630	930	366	876	7	790	990	47	771	4	463
2001	474	9	430	495	8	579	4	470	700	137	801	3	595	915	251	903	3	805	1030	147	773	6	543
2002	393	22	240	470	9	571	5	410	780	147	791	3	570	900	315	910	5	780	1030	87	745	6	558
2003	450	15	410	480	5	586	4	420	700	176	773	4	620	940	238	906	7	810	1060	67	721	6	488
2004	440	11	420	470	5	606	5	470	700	103	782	3	650	940	372	909	7	760	1050	80	765	4	560
Mean	434		391	464		582		444	704		792		605	944		899		771	1031		751		

*Note:* all fish measured mid eye to tail fork (METF) in millimeters.

<sup>a</sup> Excludes age classes composing less than 1% of the sample.

Table 7.—Age composition by sex and age class of coho salmon sampled at the Deshka River weir, 1995–2004.

Sex	Year	Age 1.1		Age 2.1		Age 1.2		Age 3.1		Age 2.2		Total			Total collected	Aged	Rejected <sup>a</sup>
		%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	<i>n</i>			
<u>Male</u>																	
	1995 <sup>b</sup>	20.9	2.2	42.7	2.7							63.7	2.6	219			
	1996 <sup>b</sup>	21.8	3.3	34.6	3.8			0.6	0.6			57.1	4.0	89			
	1997 <sup>b</sup>	18.8	2.1	40.3	2.6							59.1	2.7	204			
	1998	14.1	1.8	33.0	2.5							47.1	2.6	170			
	1999	11.9	2.0	42.8	3.0	0.4	0.4	0.4	0.4	3.0	1.0	58.4	3.0	157			
	2000	16.6	1.8	29.4	2.2							45.9	2.4	197			
	2001	21.8	1.9	29.2	2.1							50.9	2.3	248			
	2002	20.9	2.1	32.2	2.4			0.5	0.4			53.6	2.6	200			
	2003	20.5	2.2	36.1	2.6	0.3	0.3	0.6	0.4			57.5	2.7	199			
	2004	18.9	1.7	33.8	2.1			0.2	0.2			52.9	2.2	280			
	Mean	18.6		35.4		0.3		0.5		3.0		54.6		196.3			
<u>Female</u>																	
	1995 <sup>b</sup>	10.5	1.7	25.9	2.4							36.3	2.6	125			
	1996 <sup>b</sup>	12.8	2.7	30.1	3.7							43.0	4.0	67			
	1997 <sup>b</sup>	11.3	1.7	29.6	2.5							40.9	2.7	141			
	1998	16.3	2.0	36.6	2.5							52.9	2.6	191			
	1999	6.3	1.5	33.8	2.9					1.5	0.7	41.6	3.0	112			
	2000	14.9	1.7	38.7	2.4					0.5	0.3	54.1	2.4	232			
	2001	18.5	1.8	29.8	2.1			0.2	0.2	0.6	0.4	49.1	2.3	239			
	2002	15.8	1.9	30.0	2.4			0.5	0.4			46.4	2.6	173			
	2003	13.9	1.9	27.2	2.4	0.3	0.3	1.2	0.6			42.5	2.7	147			
	2004	16.8	1.6	29.7	2.0			0.6	0.3			47.1	2.2	249			
	Mean	13.7		31.1		0.3		0.6		0.9		45.4		167.6			

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Table 7.–Part 2 of 2.

		Age 1.1		Age 2.1		Age 1.2		Age 3.1		Age 2.2		Total			Total		
Sex	Year	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	<i>n</i>	collected	Aged	Rejected <sup>a</sup>
<u>Combined</u>																	
	1995 <sup>b</sup>	31.4	2.5	68.6	2.5							100.0		344	442	442	98
	1996 <sup>b</sup>	34.6	3.8	64.7	3.8			0.6	0.6			100.0		156	182	182	27
	1997 <sup>b</sup>	30.1	2.5	69.9	2.5							100.0		345	389	389	44
	1998	30.5	2.4	69.5	2.4							100.0		361	424	424	63
	1999	18.2	2.4	76.6	2.6	0.4	0.4	0.4	0.4	4.5	1.3	100.0		269	313	313	44
	2000	31.5	2.2	68.1	2.3					0.5	0.3	100.0		429	914	493 <sup>c</sup>	64
	2001	40.3	2.2	58.9	2.2			0.2	0.2	0.6	0.4	100.0		487	790	598 <sup>c</sup>	111
	2002	36.7	2.5	62.2	2.5			1.1	0.5			100.0		373	430	430	57
	2003	34.4	2.6	63.3	2.6	0.6	0.4	1.7	0.7			100.0		346	421	421	75
	2004	35.7	2.1	63.5	2.1			0.8	0.4			100.0		529	640	640	111
	Mean	32.3		66.5		0.5		0.8		1.9		100.0		363.9			

<sup>a</sup> Number of sampled fish with regenerated or inverted scales and scales missing associated sex that were excluded from analysis.

<sup>b</sup> Minor corrections were made to original data, and age-sex proportions may differ slightly from those reported in earlier publications.

<sup>c</sup> Subsample of total collected that was used for age and sex analyses.



Table 8.— Mean ( $\bar{x}$ ), standard error (SE), maximum, and minimum length-at-age (rounded to nearest mm) and sample size ( $n$ ) by sex and age class of coho salmon sampled at the Deshka River weir, 1995–2004.

Year	Age 1.1					Age 2.1					Age 1.2					Age 3.1					Age 2.2				
	$\bar{x}$	SE	Min	Max	$n$	$\bar{x}$	SE	Min	Max	$n$	$\bar{x}$	SE	Min	Max	$n$	$\bar{x}$	SE	Min	Max	$n$	$\bar{x}$	SE	Min	Max	$n$
Male																									
1995	548	6	445	660	72	553	4	430	685	147															
1996	532	9	410	630	34	536	8	430	690	54						540		540	540	1					
1997	543	6	430	630	65	552	4	410	635	139															
1998	595	6	500	710	51	587	5	420	680	119															
1999	541	9	430	630	32	544	4	430	640	115	580		580	580	1	590		590	590	1	517	17	470	610	8
2000	568	6	355	645	71	585	4	410	670	126															
2001	559	4	420	685	106	582	3	475	660	142															
2002	569	5	440	670	78	587	4	430	665	120						565	7	560	570	2					
2003	559	6	420	690	71	583	4	440	670	125	580		580	580	1	535	92	470	600	2					
2004	564	5	410	670	100	582	3	430	670	179						630		630	630	1					
Mean	558		426	662		569		431	667		580		580	580		572		558	586						
Female																									
1995	539	7	470	610	36	549	4	465	625	89															
1996	551	10	450	620	20	560	5	480	615	47															
1997	543	7	420	640	39	553	4	430	620	102															
1998	584	4	485	680	59	583	3	440	690	132															
1999	550	6	500	590	17	550	3	470	675	91											556	39	510	655	4
2000	565	4	500	640	64	576	2	475	650	166											580	30	550	610	2
2001	557	3	470	610	90	574	3	480	660	145						607	36	560	660	3	570		570	570	1
2002	570	4	480	630	59	582	3	510	650	112						575	7	570	580	2					
2003	559	5	480	620	48	577	3	490	660	94	640		640	640	1	578	19	530	600	4					
2004	565	3	460	640	89	583	3	470	670	157						610	7	600	620	3					
Mean	558		472	628		569		471	652		640		640	640		592		565	615		569		543	612	

-continued-

Table 8.–Part 2 of 2.

Year	Age 1.1					Age 2.1					Age 1.2					Age 3.1					Age 2.2				
	$\bar{X}$	SE	Min	Max	<i>n</i>	$\bar{X}$	SE	Min	Max	<i>n</i>	$\bar{X}$	SE	Min	Max	<i>n</i>	$\bar{X}$	SE	Min	Max	<i>n</i>	$\bar{X}$	SE	Min	Max	<i>n</i>
Combined																									
1995	545	5	445	660	108	552	3	430	685	236															
1996	539	7	410	630	54	547	5	430	690	101						540		540	540	1					
1997	543	5	420	640	104	552	3	410	635	241															
1998	589	4	485	710	110	585	3	420	690	251															
1999	544	6	430	630	49	547	3	430	675	206	580		580	580	1	590		590	590	1	530	16	470	655	12
2000	567	3	355	645	135	580	2	410	670	292											580	30	550	610	2
2001	558	3	420	685	196	578	2	475	660	287						607	36	560	660	3	570		570	570	1
2002	569	3	440	670	137	585	3	430	665	232						570	5	560	580	4					
2003	559	4	420	690	119	580	3	440	670	219	610	42	580	640	2	563	24	470	600	6					
2004	564	3	410	670	189	582	2	430	670	336						615	7	600	630	4					
Mean	558		424	663		569		431	671		595		580	610		581		553	600		560		530	612	

Note: Totals for all ages combined are given in Table 9.

Note: All fish were measured METF in millimeters.

Table 9.– Mean length by sex for combined ages of coho salmon sampled at the Deshka River weir, 1995–2004.

Sex	Year	Mean length	SE	<i>n</i>
<u>Male</u>				
	1995	552.3	3.4	219
	1996	534.7	5.8	89
	1997	549.0	3.5	204
	1998	589.0	3.8	170
	1999	542.4	3.9	157
	2000	579.0	3.3	197
	2001	572.6	2.8	248
	2002	580.0	3.3	200
	2003	573.8	3.5	199
	2004	575.4	2.8	280
	Mean	564.8		
<u>Female</u>				
	1995	545.8	3.4	125
	1996	557.0	4.5	67
	1997	550.6	3.3	141
	1998	583.4	2.5	191
	1999	550.6	3.1	112
	2000	573.2	2.0	232
	2001	567.8	2.1	239
	2002	577.9	2.3	173
	2003	571.6	2.9	147
	2004	576.9	2.1	249
	Mean	565.5		
<u>Combined</u>				
	1995	549.9	2.5	344
	1996	544.3	3.9	156
	1997	549.7	2.5	345
	1998	586.1	2.2	361
	1999	545.8	2.6	269
	2000	575.9	1.9	429
	2001	570.2	1.8	487
	2002	579.0	2.1	373
	2003	572.9	2.4	346
	2004	576.1	1.8	529
	Mean	565.0		

## **DISCUSSION**

### **WEIR DESIGN AND OPERATION**

The NCIMA weir design should continue to be used for the Deshka River. The use of railroad rail to anchor the weir is a unique attribute of this weir and appropriate for the Deshka River. Although bowing has taken place because of ice pushing on the rail, the rail has needed to be straightened only once in 10 years. Railroad rail is tolerant of bending and is not difficult to straighten. Other resistance board weir designs could also be effective on the Deshka River. However, 2 design factors should be considered if changes to the panels are sought: 1) ease of picket repair during weir operation and 2) potential debris (grass) accumulation. Modifications of the weir since 1995 and subsequent use through a wide array of flow conditions suggest the current design is sufficient.

### **WEIR MODIFICATIONS: 1995–2004**

Use of the incline floor mounted inside the weir trap is questionable because it interferes with trapping fish. A better apparatus might be the use of an external exit ramp as described by Tobin (1994). Terminal panel stringers and improved resistance cable guides are favorable design innovations that are currently used on the Deshka River weir. Floats should continue to be used conservatively for successful operation of the weir during high water events. Excessive use of floats (i.e., every panel outfitted) would probably create undue stress on the weir and difficulty in clearing debris from the weir. The alternate passage door has greatly improved fish passage and identification during high water.

### **SALMON COUNTS**

#### **Chinook Salmon**

Weir counts were used to assess the achievement of escapement goals, which were met for the years 1997-2004 (index-based escapement goals were met in 1997 and 1998, and weir-based escapement goals were met 1999-2004; Appendix G1). Weir counts also contributed to timely inseason management of the sport fishery (Appendix A1).

#### ***Aerial Index vs. Escapement***

Escapement indices for the Deshka River have been compared to escapement indices for other rivers in Southeast Alaska. The Alsek, Taku, and Stikine rivers escapement counts are similar to that of the Deshka River. The mean proportion (44.8%) of the escapement indexed annually on the Deshka River was about 2 times higher than the proportions indexed on these other rivers. However, unlike the Deshka River, none of these other indices included all known spawning Chinook salmon. Comparisons of counting efficiency between river systems are difficult because unique and intrinsic factors to rivers, such as reduced visibility from topography (shading, trees, etc.), water clarity (deep or occluded), or the presence of other species sharing similar phenotypic traits, all affect counting accuracy (Pahlke 2003).

Future weir counts will strengthen the relationship between aerial indices and escapement. At present, the aerial-weir regression analysis may be useful to estimate escapement from aerial indices for years when the weir is not in operation or when an incomplete weir count is observed. The regression analysis provides a confident way to estimate escapement trends for years before the weir was in operation.

## Coho Salmon

The coho salmon weir program provides insight into the Deshka River coho salmon fishery. Trends in escapement observed on the Deshka River from 1995 to 2004 follow trends observed across the NCIMA (Whitmore et al. 1996; 1997-1999; Rutz and Sweet 2000; Sweet and Rutz 2001; Sweet et al. 2003, 2004; Ivey and Sweet 2004). The coho salmon weir program was implemented in years (1995–2004) when the mean harvest was neither high (1988–1994) nor low (1977–1987) (Appendix H1–H2). More years of complete weir counts are necessary to build stock status information that may be used in the future for fisheries management.

Both 1997 and 1999 were years with poor runs for coho salmon in NCIMA streams (Whitmore and Sweet 1998; Rutz and Sweet 2000). Although the Deshka River weir count was incomplete in 1999, a poor run probably occurred here as well. Namtvedt et al. (*Unpublished*)<sup>7</sup> and Lafferty et al. (1997) found poor marine survival of coho salmon returning to Anchorage area streams in 1999, which may explain why the 1999 run was poor. The reason that the 1997 coho salmon run was low is less understood. Rebound from below-average runs counted in 1997 and 1999 on the Deshka River was observed in 2001 and 2003. In 2003, the Deshka River coho salmon escapement was in excess of 3 times the 1999 parent escapement. Aggregate escapement in 2003 from 3 other NCIMA streams (Little Susitna River, Cottonwood Creek, and Fish Creek) were also 3 times the observed aggregate parent escapement in 1999 (Shields and Fox 2005).

## Run Timing

Yearly variation in water levels and water temperatures (Appendices F1–F5) is a factor in the low predictability and inconsistent timing of the Deshka River coho salmon run (Figure 9 and Table 4). Lack of upstream movement under high water temperatures and low water levels represents typical behavior for Deshka River coho salmon (Appendices F1–F5). Reiser and Bjornn (1979) observed normal coho salmon migratory behavior at temperatures of 7.2-15.6°C. Other coho salmon stocks across the western U.S. and Canada have displayed similar migratory behavior (Groot and Margolis 1991). Water temperatures in excess of 16°C on the Deshka River during the coho salmon run likely stall upstream migration. Other factors such as the number of fish downstream of the weir, duration of time downstream of the weir, and run timing may contribute to movement patterns. Inseason assessment of run size is difficult due to such variability in run timing.

## AGE, SEX, AND LENGTH

### Chinook Salmon

ASL and weir count data collected during 10 years of weir operation, combined with historical escapement indices, recreational harvest, and marine harvest estimates led to the development of a spawner-recruit relationship for this stock. Yanusz (*In prep*)<sup>8</sup> estimated MSY at 17,230 fish based on a Ricker spawner-recruit analysis for brood years 1974–1986 and 1992–1994. The relationship was used to develop a BEG of 13,000-28,000 fish (Bue and Hasbrouck *Unpublished*)<sup>9</sup> that went into effect in 2002.

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<sup>7</sup> Namtvedt, T.B., D.G. Evans and R.J. Yanusz. *Unpublished*. Coho Salmon Smolt Abundance, Harvest, and Escapement at Cottonwood Creek during 1999-2001. Alaska Department of Fish and Game, Fisheries Data Series, Anchorage.

<sup>8</sup> Yanusz, R. *In prep*. Productivity of the Deshka River Chinook salmon stock during 1974 to 2001. Alaska Department of Fish and Game, Fishery Data Series, Anchorage

<sup>9</sup> Bue, B. G., and J. J. Hasbrouck. *Unpublished*. Escapement goal review of salmon stocks of Upper Cook Inlet. Alaska Department of Fish and Game, Report to the Alaska Board of Fisheries, November 2001 (and February 2002), Anchorage.

ASL data collected at the weir allows examination of sibling relationships (Yanusz, *In prep*).

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**APPENDIX A: DESHKA RIVER CHINOOK SALMON  
REGULATORY HISTORY, 1977–2004**

Appendix A1.–Deshka River Chinook salmon regulatory history, 1977–2004.

Year	Fishery dates	Area and time restrictions	Method and gear restrictions	Bag and possession limits	Seasonal NCI limit	Other requirements
1977	closed to adults			20" or less only		
1978	closed to adults			20" or less only		
1979	4th Sat. in May–6 Jul	mouth to Laub's Homestead marker		1/day over 20" & 1 possession	5 over 20"	punch card required
1980	4th Sat. in May–6 Jul	mouth to forks		2/day over 20", only 1 over 28" & 2 possession	5 over 20"	punch card required
1981	4th Sat. in May–6 Jul	mouth to forks		1/day over 20" & 2 possession	5 over 20"	harvest record sticker
1982	4th Sat. in May–6 Jul	mouth to forks		1/day over 20" & 2 possession	5 over 20"	permit stamp and record on back of license
1983	1 Jan –6 Jul	mouth to forks		1/day over 20" & 2 possession	5 over 20"	harvest record back of license
1984	1 Jan –6 Jul	mouth to forks		1/day over 20" & 2 possession	5 over 20"	harvest record back of license
1985	1 Jan –6 Jul	mouth to forks		1/day over 20" & 2 possession	5 over 20"	harvest record back of license
1986	1 Jan –6 Jul	mouth to forks		over 16": 2/day & 4 possession, only 1/day & 2 possession over 28"	5 over 16"	harvest record back of license
1987	1 Jan–13 Jul	mouth to forks		over 16": 2/day & 4 possession, only 1/day & 2 possession over 28"	5 over 16"	harvest record back of license
1988	1 Jan–13 Jul	mouth to forks		over 16": 2/day & 4 possession, only 1/day & 2 possession over 28"	5 over 16"	harvest record back of license

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Year	Fishery dates	Area and time restrictions	Method and gear restrictions	Bag and possession limits	Seasonal NCI limit	Other requirements
1989	1 Jan–13 Jul	mouth to forks		over 16": 2/day & 4 possession, only 1/day & 2 possession over 28"	5 over 16"	
1990	1 Jan–13 Jul	mouth to forks		over 16": 2/day & 4 possession, only 1/day & 2 possession over 28"	5 over 16"	
1991	1 Jan–13 Jul	mouth to forks		over 16": 2/day & 4 possession, only 1/day & 2 possession over 28"	5 over 16"	
1992	1 Jan–13 Jul	mouth to forks	no bait between mouth of Trapper Creek and confluence of Moose and Kroto Creeks on 22 June by EO 2-KS-2-15-92	1/day over 16" & 1 possession. Release of fish over 16" between Trapper and confluence of Moose and Kroto Creeks on June 22 by EO	5 over 16"	
1993	1 Jan–13 Jul	mouth to forks	artificial only until 15 May	1/day over 16" & 2 possession	5 over 16"	king stamp and harvest record back of license
1994	closed June 17 by EO 2-KS-2-13-94	mouth to forks	artificial only until 16 May	1/day over 16" & 2 possession	5 over 16"	king stamp and Harvest record back of license
1995	Closed					
1996	Closed					
1997	opened June 21 by EO 2-KS-2-15-97	lower 2 miles of river	artificial only	1/day over 16" & 1 possession	5 over 16"	king stamp and harvest record back of license
1998	1 Jan–13 Jul	lower 5 miles of river	artificial only	1/day over 16" & 1 possession	5 over 16", only 2 from Deshka	king stamp and harvest record back of license

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Year	Fishery dates	Area and time restrictions	Method/Gear restrictions	Bag & possession	Seasonal NCI limit	Other requirements
1999	1 Jan–13 Jul	mouth to Chijuk Creek, 6 am–11 pm	artificial only	1/day over 16" & 1 possession	5 over 16"	king stamp and harvest record back of license
2000	1 Jan–13 Jul	mouth to Chijuk Creek, 6 am–11 pm	bait allowed 8 June by EO 2-KS-2-05-00	1/day over 16" & 1 possession	5 over 16"	king stamp and harvest record back of license
2001	1 Jan–13 Jul	mouth to Chijuk Creek, 6 am–11 pm	bait allowed 12 June by EO 2-KS-2-04-01	1/day over 20" & 1 possession	5 over 20"	king stamp and harvest record back of license
2002	1 Jan–13 Jul	mouth to Chijuk Creek, 6 am–11 pm	bait allowed by regulation 8 June	1/day over 20" & 2 possession	5 over 20"	king stamp and harvest record back of license
2003	1 Jan–13 Jul	mouth to Chijuk Creek, 6 am–11 pm	bait allowed by regulation 8 June	2/day over 20" & 4 possession on June 18 by EO	5 over 20"	king stamp and harvest record back of license
2004	1 Jan–13 Jul	mouth to Chijuk Creek, 6 am–11 pm	bait allowed 28 May by EO 2-KS-2-04-04	2/day over 20" & 4 possession on June 12 by EO 2-KS-2-06-04	5 over 20"	king stamp and harvest record back of license



## **APPENDIX B: DESHKA RIVER WEIR DESIGN AND CONSTRUCTION DETAILS**

## Appendix B1.–Deshka weir design and construction details.

*Weir design modifications:* The original resistance board weir was engineered by Daishin Kogyo Co., Ltd and distributed by Mitsubishi International Corp., Seattle, WA. The Daishin weir incorporates elliptical pickets to reduce hydrodynamic pressure. This design was modified in the mid-1980s (Larry Bartlett, ADF&G Division of Sport Fish, Fishery Biologist, personal communication) to reduce construction costs and increase its practicality for use on rivers within the North Cook Inlet Management Area. Modifications included 4 major substitutions and 1 addition: 1) Polyvinyl chloride (PVC) conduit and conduit hangers replaced expensive elliptical pickets and customized stainless steel bands used to fasten pickets to the Daishin-style weir's wooden stringers; 2) aluminum stringers were substituted for wooden stringers; 3) triangular “wing” panels were fastened atop and at right angles along the length of weir panels at each end of the weir and on both sides of the trap to replace heavy substrate-anchored bulkheads; 4) a railroad rail was used to anchor the weir to the substrate instead of concrete; and 5) a boat gate was incorporated into the weir to accommodate boat passage.

*Individual weir panel details:* PVC pickets were capped at each end to create individual air chambers. Stringers consisting of 2.5 cm (1 in) square aluminum tubing held pickets in place, running perpendicular to and underneath pickets. Pickets were fastened to stringers by 2-hole conduit hangers.

*Weir construction:* The upstream end of each panel was attached to a 10 mm (3/8 in) cable, which was threaded along a railroad rail spanning the entire river bottom, perpendicular to its flow. Panels were joined with 12 mm (0.5 in) aluminum rods to allow articulation between adjacent panels.

**APPENDIX C: DESHKA RIVER WEIR PASSAGE DATA,  
1995–2004**

Appendix C1.-Deshka River weir passage data for 1995.

Date	Chinook salmon					Coho salmon			Sockeye salmon daily count	Chum salmon daily count	Pink salmon daily count	Northern pike daily count	General comments
	Daily count	Cumulative	Sampled <i>n</i>	Female %	Female no.	Daily count	Cumulative	Daily sampled					
20 May													
21 May	1	1										1	
22 May	2	3										2	
23 May	0	3											
24 May	0	3											
25 May													0800 hrs weir under water
26 May													weir under water
27 May													weir under water
28 May													weir under water
29 May													2000 hrs weir fish tight
30 May	4	7	2	50%	1							1	
31 May	5	12	5	20%	1							1	
1 Jun	7	19	7	29%	2								
2 Jun	2	21	2	50%	1								
3 Jun	3	24	2	50%	1								
4 Jun	6	30	6	50%	3								
5 Jun	0	30											
6 Jun	3	33	3	0%	0							1	
7 Jun	3	36	6	33%	2								
8 Jun	8	44	8	25%	2								
9 Jun	3	47	3	100%	3								
10 Jun	2	49	2	50%	1								
11 Jun	10	59	10	90%	9								
12 Jun	15	74	15	53%	8								
13 Jun	9	83	9	89%	8								
14 Jun	23	106	23	52%	12								
15 Jun	30	136											

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Date	Chinook salmon					Coho salmon			Sockeye salmon daily count	Chum salmon daily count	Pink salmon daily count	Northern pike daily count	General comments
	Daily count	Cumulative	Sampled <i>n</i>	Female %	Female no.	Daily count	Cumulative	Daily sampled					
16 Jun	107	243											
17 Jun	180	423											
18 Jun	1,676	2,099	11	64%	7								
19 Jun	878	2,977	9	22%	2								
20 Jun	2,585	5,562	11	36%	4								
21 Jun	254	5,816	17	53%	9								
22 Jun	319	6,135	18	44%	8								
23 Jun	38	6,173	25	40%	10								
24 Jun	12	6,185	12	58%	7								
25 Jun	147	6,332	42	40%	17								
26 Jun	9	6,341	7	0%	0								
27 Jun	3	6,344											
28 Jun	338	6,682	18	44%	8								
29 Jun	885	7,567	23	30%	7								
30 Jun	11	7,578	11	27%	3								
1 Jul	311	7,889	9	33%	3								
2 Jul	74	7,963	20	30%	6								
3 Jul	169	8,132	40	40%	16	1							
4 Jul	227	8,359	20	40%	8	0			1				
5 Jul	96	8,455	15	47%	7	0	1		0				
6 Jul	23	8,478	8	13%	1	2	3		0				
7 Jul	323	8,801	15	13%	2	0	3		0				
8 Jul	132	8,933	3	67%	2	0	3		0				
9 Jul	72	9,005	3	67%	2	0	3		0				
10 Jul	7	9,012	7	29%	2	1	4		0				
11 Jul	41	9,053	7	43%	3	0	4	1	0				

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Date	Chinook salmon					Coho salmon			Sockeye salmon daily count	Chum salmon daily count	Pink salmon daily count	Northern pike daily count	General comments
	Daily count	Cumulative	Sampled <i>n</i>	Female %	Female no.	Daily count	Cumulative	Daily sampled					
12 Jul	73	9,126	2	50%	1	4	8		0		1		
13 Jul	16	9,142	4	25%	1	2	10	2	0		3		
14 Jul	131	9,273				4	14		1		4		
15 Jul	12	9,285				0	14		0		2		
16 Jul	51	9,336				3	17		0		0		
17 Jul	3	9,339				0	17		0		0		
18 Jul	46	9,385				1	18		0		2		
19 Jul	17	9,402				6	24	6	2		27		
20 Jul	13	9,415				0	24		0		9		
21 Jul	5	9,420				1	25	1	0		7		
22 Jul	3	9,423				4	29	4	2		160		
23 Jul	8	9,431				5	34	2	1		171		
24 Jul	0	9,431				0	34		0		29		
25 Jul	4	9,435				65	99	30	129	1	379		
26 Jul	6	9,441				37	136	7	228	0	1,104		
27 Jul	4	9,445				1,136	1,272	10	361	0	5,134		
28 Jul	4	9,449				476	1,748	15	137	0	4,024		
29 Jul	0	9,449				57	1,805	8	39	0	2,875		
30 Jul	18	9,467				374	2,179	10	71	0	2,701		
31 Jul	18	9,485				92	2,271	10	36	0	268		
1 Aug	14	9,499				73	2,344	10	16	0	295		
2 Aug	27	9,526				196	2,540	10	41	0	1,496		
3 Aug	20	9,546				452	2,992	10	39	0	998		
4 Aug	17	9,563				478	3,470	13	31	0	2,398		
5 Aug	23	9,586				751	4,221	15	14	0	2,620		
6 Aug	58	9,644				1,815	6,036	12	31	0	3,975		

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Date	Chinook salmon					Coho salmon			Sockeye salmon daily count	Chum salmon daily count	Pink salmon daily count	Northern pike daily count	General comments
	Daily count	Cumulative	Sampled <i>n</i>	Female %	Female no.	Daily count	Cumulative	Daily sampled					
7 Aug	15	9,659				149	6,185	14	9	0	576		
8 Aug	17	9,676				150	6,335	14	7	0	1,038		
9 Aug	50	9,726				368	6,703	12	10	0	1,479		
10 Aug	41	9,767				468	7,171	10	19	2	918		
11 Aug	51	9,818				495	7,666	10	14	0	1,947		
12 Aug	61	9,879				365	8,031		22	0	2,542		
13 Aug	59	9,938				759	8,790	10	27	0	2,271	2	
14 Aug	43	9,981				612	9,402	10	9	0	4,016	1	
15 Aug	18	9,999				299	9,701	10	7	0	256		
16 Aug	8	10,007				347	10,048	10	2	0	189		
17 Aug	4	10,011				35	10,083	10	3	0	88		
18 Aug	14	10,025				253	10,336	17	22	0	238		
19 Aug	5	10,030				69	10,405	9	13	0	133		
20 Aug	0	10,030				172	10,577	10	7	0	112	1	
21 Aug	4	10,034				90	10,667	10	7	0	66		
22 Aug	4	10,038				10	10,677	10	1	1	14		
23 Aug	2	10,040				91	10,768	10	3	0	7	5	
24 Aug	1	10,041				152	10,920	10	10	0	14	1	
25 Aug	1	10,042				235	11,155	10	4	0	4		
26 Aug	2	10,044				156	11,311	10	1	0	1		
27 Aug	0	10,044				51	11,362	10	0	0	0		
28 Aug	0	10,044				341	11,703	10	2	0	0	1	
29 Aug	1	10,045				48	11,751	10	2	0	2		
30 Aug	0	10,045				28	11,779	10	3	0	1	2	
31 Aug	0	10,045				513	12,292	10	3	0	0		
1 Sep	3	10,048				532	12,824	10	1	1	0		
2 Sep													weir under water
3 Sep													weir under water
4 Sep													weir under water
Totals		10,048	460	41%	190		12,824	442	1,388	5	44,594	19	

Appendix C2.–Deshka River weir passage data for 1996.

Date	Chinook salmon					Coho salmon			Sockeye salmon daily count	Chum salmon daily count	Pink salmon daily count	Northern pike daily count	General comments
	Daily count	Cumulative	Sampled <i>n</i>	Female %	Female no.	Daily count	Cumulative	Daily sampled					
20 May													
21 May													
22 May													
23 May	1	1	1	100%	1								
24 May	3	4	3	67%	2								
25 May	7	11	7	71%	5								
26 May	58	69	1	100%	1								
27 May	9	78											
28 May	0	78											
29 May	26	104											
30 May	80	184											
31 May	83	267											
1 Jun	84	351	10	60%	6								
2 Jun	171	522	18	44%	8								
3 Jun	157	679	3	67%	2								
4 Jun	46	725	7	43%	3								
5 Jun	36	761	6	33%	2								
6 Jun	106	867											
7 Jun	550	1,417	1	0%									
8 Jun	154	1,571											
9 Jun	754	2,325											
10 Jun	835	3,160											
11 Jun	733	3,893	14	50%	7								
12 Jun	862	4,755	27	30%	8								
13 Jun	293	5,048	14	57%	8								
14 Jun	607	5,655	14	36%	5								
15 Jun	493	6,148	15	60%	9								

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Date	Chinook salmon					Coho salmon			Sockeye salmon daily count	Chum salmon daily count	Pink salmon daily count	Northern pike daily count	General comments
	Daily count	Cumulative	Sampled <i>n</i>	Female %	Female no.	Daily count	Cumulative	Daily sampled					
16 Jun	489	6,637	14	36%	5								
17 Jun	1,884	8,521	14	29%	4								
18 Jun	1,006	9,527	14	14%	2								
19 Jun	804	10,331	14	36%	5								
20 Jun	232	10,563											
21 Jun	111	10,674	15	27%	4								
22 Jun	143	10,817	13	8%	1								
23 Jun	394	11,211	14	21%	3								
24 Jun	913	12,124	18	11%	2								
25 Jun	73	12,197	16	13%	2								
26 Jun	106	12,303	10	10%	1								
27 Jun	58	12,361	14	14%	2								
28 Jun	74	12,435	9	33%	3								
29 Jun	122	12,557	15	47%	7								
30 Jun	82	12,639	10	10%	1								
1 Jul	244	12,883	13	38%	5								
2 Jul	57	12,940											
3 Jul	69	13,009	20	20%	4								
4 Jul	514	13,523	9	11%	1								
5 Jul	194	13,717	11	55%	6								
6 Jul	69	13,786	7	29%	2								
7 Jul	60	13,846	15	13%	2								
8 Jul	26	13,872	19	16%	3								
9 Jul	18	13,890	15	20%	3								
10 Jul	11	13,901	8	13%	1								
11 Jul	4	13,905	4	25%	1								

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Date	Chinook salmon					Coho salmon			Sockeye salmon daily count	Chum salmon daily count	Pink salmon daily count	Northern pike daily count	General comments
	Daily count	Cumulative	Sampled <i>n</i>	Female %	Female no.	Daily count	Cumulative	Daily sampled					
12 Jul	4	13,909	4	25%	1								
13 Jul	0	13,909											
14 Jul	24	13,933	24	25%	6	1	1		1				
15 Jul	9	13,942	9	22%	2	0	1		0				
16 Jul	32	13,974				2	3	2	0				
17 Jul	29	14,003				18	21	18	1		2		
18 Jul	10	14,013				1	22	1	6		4		
19 Jul	21	14,034				16	38	16	16		7		
20 Jul	102	14,136				97	135	20	36		199		
21 Jul	68	14,204				56	191	12	16		840		
22 Jul	30	14,234				6	197	3	3		630		
23 Jul	23	14,257				44	241	9	25		2,677		
24 Jul	48	14,305				128	369	11	46		5,298		
25 Jul	27	14,332				409	778	14	205	1	8,869		
26 Jul	17	14,349				479	1,257	22	42		12,818		
27 Jul	0	14,349				137	1,394	10	19		6,122		
28 Jul	0	14,349				0	1,394		0		16		
29 Jul								4					weir under water
30 Jul								40					
31 Jul													
Totals		14,349	489	30%	146		1,394	182	416	1	37,482		

Appendix C3.-Deshka River weir passage data for 1997.

Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem. %	Fem. no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
28 May	3	3															weir was fish tight at 2000 hours
29 May	360	363															
30 May	3	366															
31 May	0	366	2	100%	2												
1 Jun	436	802	10	70%	7												
2 Jun	96	898	10	100%	10								1.50		clear	6	
3 Jun	14	912	9	100%	9								1.40		clear	4	
4 Jun	213	1,125	17	71%	12								1.30	15	clear		104 kings through this morning
5 Jun	1,522	2,647	20	65%	13								1.26	14	clear	2	
6 Jun	656	3,303	20	45%	9								1.24	14	clear	5	
7 Jun	1,538	4,841	14	64%	9								1.24	14	clear	6	
8 Jun	2,198	7,039	13	46%	6								1.24	14	clear	0	100 kings as of 800 hours
9 Jun	366	7,405	7	71%	5								1.24	15	clear	3	
10 Jun	1,521	8,926	11	82%	9								1.30	16	clear	2	
11 Jun	1,918	10,844	5	80%	4								1.24	16.5	clear	2	
12 Jun	2,999	13,843	36	69%	25								1.20	15	clear	0	
13 Jun	1,439	15,282	28	79%	22								1.13	15	clear	9	
14 Jun	3,751	19,033	30	67%	20								1.10	15	clear	5	
15 Jun	1,425	20,458	30	43%	13								1.10	16	clear	3	
16 Jun	226	20,684	30	40%	12								1.04	18	clear	0	
17 Jun	313	20,997	30	53%	16								1.04	18	clear	0	
18 Jun	2,734	23,731	30	16%	5								1.02	18	clear	0	
19 Jun	1,664	25,395											0.98	16	clear	2	
20 Jun	2,730	28,125	23	70%	16								1.02	16	clear	8	
21 Jun	157	28,282	4	25%	1								1.21	16	clear	10	

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Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem. %	Fem. no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
22 Jun	1,906	30,188	50	54%	27								1.40	18	little color	15	
23 Jun	115	30,303	5	80%	4								1.30	21	cloudy	1	fish behind weir and between riffle, 295
24 Jun	1,823	32,126	15	53%	8								1.10	20	clear	0	
25 Jun	86	32,212	5	80%	4								1.00	21	clear	0	
26 Jun	226	32,438	7	71%	5								0.94	22	clear	1	
27 Jun	281	32,719	6	50%	3								0.88	21	clear	12	
28 Jun	6	32,725	5	80%	4								0.82	23	clear	7	
29 Jun	9	32,734	6	50%	3								0.73	21	clear	2	
30 Jun	66	32,800	7	43%	3								0.76	22	clear	3	
1 Jul	0	32,800											0.70	22	clear	2	
2 Jul	3	32,803	1	100%	1								0.64	22	clear	3	
3 Jul	0	32,803											0.60	22	clear	8	
4 Jul	98	32,901	7	57%	4								0.65	21	clear	5	
5 Jul	101	33,002	7	43%	3								0.65	21	clear	4	
6 Jul	17	33,019	9	67%	6								0.65	22	clear	13	
7 Jul	64	33,083	7	100%	7	1	1	1	1				0.63	21	clear	1	
8 Jul	95	33,178	6	83%	5	0	1		0				0.60	21	clear	2	
9 Jul	27	33,205	6	17%	1	0	1		0				0.55	19	clear	2	
10 Jul	110	33,315	6	33%	2	0	1		0		1		0.60	18	clear	3	2 rafts/1 airboat
11 Jul	282	33,597	6	67%	4	0	1		0		0		0.64	19	clear	2	
12 Jul	93	33,690	5	60%	3	0	1		0		0		0.74	20	clear	5	
13 Jul	266	33,956				0	1		0		0		0.80	19	clear	4	
14 Jul	42	33,998	7	57%	4	0	1		0		0		0.98	20	clear	1	
15 Jul	212	34,210	5	40%	2	22	23	10	14		0		1.68	18	dark	0	dark water, with a bad glare on it

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	Chinook salmon					Coho salmon					Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem. %	Fem. no.	Daily count	Cum.	n	Sockeye salmon	Chum salmon	Pink salmon	Stage (ft)	Temp. (°C)	Clarity (relative)		
16 Jul	551	34,761	5	60%	3	23	46	6	8		0	1.62	17	murky	1	no clips
17 Jul	1	34,762				3	49	3	16		0	1.40	18	murky	3	water dropping fast
18 Jul	8	34,770	3	0%	0	4	53	3	25		0	1.35	19	cloudy	15	
19 Jul	22	34,792	2	50%	1	2	55	1	0		0	1.20	19	?	13	
20 Jul	1	34,793				0	55		0		0	1.05	20	?	2	
21 Jul	6	34,799				1	56	1	0		1	0.95	19	clear	1	
22 Jul	3	34,802				0	56		0		0	1.00	17	clear	0	
23 Jul	5	34,807				6	62	6	13		1	1.10	18	clear	4	
24 Jul	5	34,812				18	80	11	21		7	1.10	18	clear	0	
25 Jul	36	34,848				218	298	10	109		32	1.10	20	clear	12	
26 Jul	1	34,849				2	300	2	6		4	0.96	23	clear	14	
27 Jul	6	34,855				10	310	10	18		3	0.96	23	clear	9	
28 Jul	15	34,870				4	314	4	22		4	0.80	24	clear	1	
29 Jul	11	34,881				1	315	1	13		10	0.74	24	clear	5	
30 Jul	14	34,895				0	315		4		8	0.68	21	clear	5	
31 Jul	1	34,896				1	316		3		0	0.65	19	clear	2	
1 Aug	7	34,903				0	316		0		0	0.65	19	clear	14	
2 Aug	1	34,904				9	325		5		25	0.65	19	clear	13	
3 Aug	3	34,907				1	326	1	2		14	0.60	19	clear	7	
4 Aug	5	34,912				6	332	2	13		5	0.60	21	clear	2	2 coho sampled; 1 M, 1F coho
5 Aug	1	34,913				16	348	7	2		9	0.58	20	clear	6	7 coho sampled; 5 M, 2F coho
6 Aug	5	34,918				0	348		1		9	0.60	18	clear	2	
7 Aug	3	34,921				3	351	3	1		6	0.58	19	clear	1	3 coho sampled; 2 M, 1 F
8 Aug	2	34,923				0	351		16		8	0.58	19	clear	10	

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Date	Chinook salmon					Coho salmon					Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem. %	Fem. no.	Daily count	Cum.	n	Sockeye salmon	Chum salmon	Pink salmon	Stage (ft)	Temp. (°C)	Clarity (relative)		
9 Aug	1	34,924				0	351		7		8	0.60	17	clear	7	
10 Aug	2	34,926				254	605	20	132		164	0.80	20	clear	0	
11 Aug	41	34,967				23	628	10	14		95	0.98	16	clear	0	10 coho sampled
12 Aug	139	35,106				1,205	1,833	30	29		138	1.12	17	clear	1	100 samples
13 Aug	72	35,178				867	2,700	20	6		69	1.36	19	murky	0	
14 Aug	56	35,234				447	3,147	14	3		123	1.40	18	murky	5	
15 Aug	145	35,379				495	3,642	15	11		97	1.20	18	clearing	7	no fish activity at mouth.
16 Aug	78	35,457				153	3,795	6	4	1	51	1.10	17	clear	4	no fish activity at mouth
17 Aug	46	35,503				277	4,072	9	16	2	55	1.00	16	clear	2	no fish activity at mouth
18 Aug	19	35,522				126	4,198	4	16	1	41	0.95	17	clear	1	
19 Aug	13	35,535				102	4,300	3	7	1	31	0.90	17	clear	2	
20 Aug	11	35,546				41	4,341	2	7	1	23	0.80	15	clear	2	300 fish at weir not moving
21 Aug	8	35,554				43	4,384	10	8	0	10	0.96	13	dark	2	5 male, 5 females, coho sampled
22 Aug	13	35,567				2,727	7,111	90	16	1	37	1.60	13	dark	6	54 male, 36 females coho sampled
23 Aug	2	35,569				573	7,684	20	2	0	1	1.84	12	dark	11	10 male, 10 female coho sampled
24 Aug	3	35,572				32	7,716	7	1	1	2	1.58	18	dark	1	5 male, 2 female coho sampled
25 Aug	4	35,576				18	7,734	6	6	0	0	1.36	15	dark	2	3 males, 3 females sampled

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Date	Chinook salmon					Coho salmon					Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	<i>n</i>	Fem. %	Fem. no.	Daily count	Cum.	<i>n</i>	Sockeye salmon	Chum salmon	Pink salmon	Stage (ft)	Temp. (°C)	Clarity (relative)		
26 Aug	0	35,576				46	7,780	10	9	0	4	1.62	14	dark	2	4 males, 6 females samples
27 Aug	4	35,580				111	7,891	10	1	1	0	3.22	12	dark	2	6 males, 4 females sampled
28 Aug	4	35,584				47	7,938	3	2	0	2	2.70	13	dark	0	2 males, 1 females sampled
29 Aug	0	35,584				6	7,944	3	0	0	1	2.10	14	murky	5	3 males sampled
30 Aug	1	35,585				8	7,952	3	1	1	1	1.90	14		7	1 male, 2 females sampled
31 Aug	0	35,585				22	7,974	4	1	0	0	1.35	12		2	4 scales, 50/50, water at 2.20 in PM
1 Sep	0	35,585				35	8,009	3	1	1	1	2.75	11		2	weir under water at 10 PM.
2 Sep	–	–				–	–									weir down
3 Sep	2	35,587				36	8,045	3	1	1	0	3.30	11	clearing	1	water stage at 2.9 at 10 PM
4 Sep	0	35,587				3	8,048		0	0	0	2.46	11	dark	0	water going down
5 Sep	0	35,587				8	8,056	2	0	0	0	2.20	12	dark	4	
6 Sep	0	35,587				3	8,059		0	0	0	2.10	12	dark	6	
7 Sep	0	35,587				4	8,063		0	0	0	1.90	13	dark	3	
8 Sep	0	35,587				0	8,063		0	0	0					
9 Sep																
Totals		35,587	567	59%	332		8,063	389	614	12	1,101					

Appendix C4.-Deshka River weir passage data for 1998.

	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
16 Jun	157	157											1.30	21	clear	0	fish tight at 6 PM
17 Jun	343	500	60%	12	20								1.10	16	clear	2	temp taken at midnight
18 Jun	1,009	1,509	65%	13	20								1.02	18	clear	9	
19 Jun	1,082	2,591	45%	9	20								0.98	18	clear	28	
20 Jun	3,518	6,109	57%	17	30								0.90	18	sl. turbid	20	
21 Jun	692	6,801	60%	12	20								0.94	16	sl. turbid	25	
22 Jun	537	7,338	50%	10	20								1.30	16	turbid	6	
23 Jun	188	7,526	55%	11	20								1.50	17	very turbid	6	called in at 10:40 PM - can't see to count fish anymore
24 Jun	1,609	9,135	48%	12	25								1.20	17	turbid	6	
25 Jun	264	9,399	75%	15	20								1.10	18	clear	2	
26 Jun	179	9,578	60%	18	30								0.94	18	clear	11	
27 Jun	1,321	10,899	50%	10	20								0.86	18	clear	25	
28 Jun	1,035	11,934	50%	10	20								0.78	19	clear	18	
29 Jun	183	12,117	47%	14	30								0.66	21	clear	3	
30 Jun	861	12,978	55%	11	20								0.66	23	clear	0	
1 Jul	343	13,321	50%	5	10								0.58	20	clear	0	
2 Jul	43	13,364	0%	0	2								0.58	20	clear	6	
3 Jul	88	13,452	33%	1	3								0.45	19	clear	10	
4 Jul	71	13,523	50%	1	2								0.41	21	clear	17	
5 Jul	466	13,989	33%	3	9								0.40	19.5	clear	7	
6 Jul	179	14,168	33%	1	3						6		0.47	18	clear	0	
7 Jul	6	14,174	50%	1	2								0.58	17	clear	2	
8 Jul	33	14,207	50%	1	2	1	1	1					0.75	16.5	clear	0	
9 Jul	25	14,232	57%	4	7	3	4	1					0.86	19	clear	1	light debris
10 Jul	76	14,308	63%	5	8	6	10				1		0.74	17	dark	11	

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## Appendix C4.–Page 2 of 4.

Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
11 Jul	19	14,327	60%	6	10	0	10				1		0.60	17	dark	7	
12 Jul	163	14,490	67%	2	3	3	13				3		0.58	17	dark	2	
13 Jul	12	14,502				7	20				8		0.58	18	clear	2	
14 Jul	2	14,504				4	24				4		0.56	18	clear	0	
15 Jul	247	14,751				22	46				173		0.50	17	clear	0	
16 Jul	4	14,755				4	50	1			100		0.49	19.5	clear	0	
17 Jul	10	14,765				32	82	7		250	273		0.59	20	clear	10	
18 Jul	23	14,788				18	100	4	2	0	1,347		0.58	20	clear	13	
19 Jul	84	14,872				112	212	10	0	0	7,411		0.45	20	clear	15	
20 Jul	22	14,894				158	370	9	0	0	24,744		0.35	20	clear	2	
21 Jul	23	14,917				170	540	10	0	0	38,643		0.30	20.5	clear		
22 Jul	55	14,972				184	724	11	3	0	35,117		0.27	20	clear	1	
23 Jul	38	15,010				119	843	5	5	0	19,800		0.28	19	clear	3	
24 Jul	30	15,040				229	1,072	20	4	0	15,436		0.38	19	dark	15	
25 Jul	18	15,058				411	1,483	30	3	0	46,081		0.88	18	dark	13	
26 Jul	2	15,060				698	2,181	30	22	0	31,400		0.96	17	dark	10	
27 Jul	68	15,128				2,099	4,280	30	15	0	18,855		1.18	17	dark	2	
28 Jul	6	15,134				224	4,504	11	10	0	10,704		0.98	17	dark	6	
29 Jul	12	15,146				187	4,691	14	5	0	15,320		0.88	17	dark	6	
30 Jul	2	15,148				90	4,781	7	0	0	23,254		0.66	20	clear		
31 Jul	2	15,150				105	4,886	10	1	0	47,282		0.50	21.5	clear	27	
1 Aug	3	15,153				150	5,036	16	6	0	58,767		0.38	21.5	clear	34	
2 Aug	33	15,186				137	5,173	10	4	0	52,364		0.28	20	clear	25	
3 Aug	28	15,214				163	5,336	17	2	0	44,910		0.24	18	clear	10	
4 Aug	20	15,234				167	5,503	10	10	0	26,157		0.20	17	clear	10	
5 Aug	43	15,277				193	5,696	20	8	1	14,431		0.32	16.5	clear	7	

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Date	Chinook salmon					Coho salmon					Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n	Sockeye salmon	Chum salmon	Pink salmon	Stage (ft)	Temp. (°C)	Clarity (relative)		
6 Aug	19	15,296				166	5,862	17	2	0	8,463	1.24	16	dark	3	
7 Aug	0	15,296				224	6,086		0	0	386	2.58	16	dark	5	
8 Aug	weir under water											2.78	15	dark	8	weir under water; fish passing over weir.
9 Aug	weir under water											2.50	15	dark	4	weir under water; fish passing over weir.
10 Aug	weir under water											2.78	15	dark	6	weir under water; fish passing over weir.
11 Aug	weir under water											2.50	15	dark	3	weir under water; fish passing over weir.
12 Aug	weir under water											1.78	15	dark	3	weir under water; fish passing over weir.
13 Aug	11	15,307				133	6,219	30	1	0	113	1.25	16	dark	5	weir up at 1700 hours; 30 coho sampled
14 Aug	30	15,337				110	6,329	30	0	0	0	1.04	17.5	dark	16	30 coho sampled
15 Aug	33	15,370				106	6,435	10	0	0	175		16	dark	18	10 coho sampled
16 Aug	18	15,388				42	6,477	3	0	0	93	0.85	16.5	dark	12	3 coho sampled
17 Aug	2	15,390				20	6,497	1	0	0	30	1.80	14.5	dark	6	1 coho sampled
18 Aug	4	15,394				11	6,508		0	0	23	2.45	14.5	dark	3	0 coho sampled
19 Aug	13	15,407				21	6,529		0	0	31	1.70	14.5	dark	3	looking real fine operating conditions
20 Aug	1	15,408				0	6,529		0	1	2	1.20	14.5	dark	2	
21 Aug	0	15,408				8	6,537	9	0	0	2	2.00	14	dark	6	
22 Aug	0	15,408				0	6,537		0	0	0	2.78	14	dark	6	weir under water @ 2 PM; 1 pike @ 52 cm

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Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>					Stage (ft)	Temp. (°C)	Clarity (relative)		
23 Aug	weir under water												3.20	14	dark	3	weir under water
24 Aug	weir under water												2.50	14	dark	1	weir under water
25 Aug	weir under water												2.20	14	dark	0	weir under water
26 Aug	0	15,408				9	6,546	9	0	1	11		2.20	14	muddy	0	water starting to rise
27 Aug	0	15,408				9	6,555		0	0	5		2.60	14	dark	1	
28 Aug	0	15,408				3	6,558		0	1	4		2.27	14	dark	8	
29 Aug	0	15,408				10	6,568		0	0	5		2.00	14.5	dark	5	
30 Aug	0	15,408				14	6,582		1	0	4		1.80	14.5	dark	6	
31 Aug	0	15,408				112	6,694	3	0	0	3		1.50	14	dark	3	
1 Sep	0	15,408				16	6,710		1	0	1		1.30	14	dark	4	
2 Sep	1	15,409				17	6,727		0	3	3		1.10	14	dark	0	
3 Sep	0	15,409				13	6,740	9	0	3	0		1.00	14	dark	0	9 coho sampled; 4 female
4 Sep	0	15,409				16	6,756	10	1	2	0		0.94	13	dark	7	10 coho sampled; 6 female
5 Sep	0	15,409				0	6,756		0	2	0		0.88	13	dark	5	
6 Sep	0	15,409				17	6,773	9	1	0	0		0.80	13	dark	2	9 coho sampled; 6 females
7 Sep																	WEIR PULLED
Totals		15,409	54%	204	376		6,773	424	107	264	541,946						

Appendix C5.–Deshka River weir passage data for 1999.

Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
17 May													3.00	cold	dirty		can't see the rail
18 May													2.80	cold	dirty		can't see the rail
19 May													2.50	cold	dirty		can't see the rail
20 May													1.70	cold	dirty		can't see the rail
21 May																	
22 May																	
23 May																	
24 May																	
25 May																	
26 May																	
27 May																	
28 May																	fish tight at 2330
29 May	12	12											1.80	10	dirty	24	
30 May	9	21	2	0%	0								1.80	10	dirty	17	
31 May	51	72	10	40%	4								1.60	10.25	dirty	7	28% of fish passed were jacks, 1 pike and 2 RBT in cage
1 Jun	288	360	18	50%	9								1.67	10	dirty	5	
2 Jun	33	393	13	54%	7								1.92	10	dirty	3	water rising
3 Jun	40	433	40	38%	15								2.95	10	dirty	2	water over weir, no count
4 Jun	15	448	15	53%	8								2.98	10	dirty	15	0.5 ft water clarity
5 Jun	21	469	16	63%	10								2.48	10	cloudy	22	1 ft water clarity
6 Jun	822	1,291	17	41%	7								2.05	13	clearing	24	2 ft water clarity
7 Jun	1,796	3,087	16	56%	9								1.75	14	clearing	10	2 ft water clarity
8 Jun	2,191	5,278	10	50%	5								1.60	14	clearing	8	2 ft water clarity
9 Jun	781	6,059											1.40	15	clear	11	
10 Jun	362	6,421	16	0%	0								1.36	15	clear	7	boat gate operational
11 Jun	339	6,760	10	50%	5								1.20	15	clear	22	

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## Appendix C5.–Page 2 of 4.

Date	Chinook salmon					Coho salmon							River water			Boats through weir	General comments
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>	Sockeye salmon	Chum salmon	Pink salmon	Northern pike	Stage (ft)	Temp. (°C)	Clarity (relative)	(no.)	
12 Jun	1,028	7,788	49	49%	24								0.80	15	clear	24	moved staff guage to 1 foot
13 Jun	576	8,364	34	35%	12								0.78	15	clear	22	
14 Jun	1,252	9,616	30	47%	14								0.76	16	clear	6	
15 Jun	2,380	11,996	37	54%	20								0.68		clear	11	
16 Jun	171	12,167	16	19%	3								0.60	17	clear	9	did not get temperature
17 Jun	873	13,040	27	52%	14								0.60	17	clear	9	
18 Jun	1,547	14,587	16	69%	11								0.70	15	clear	16	
19 Jun	4,372	18,959	14	36%	5								0.80	15	clear	15	
20 Jun	2,360	21,319	0										0.80	15	clear	12	water rising fast
21 Jun	524	21,843	24	54%	13								1.00	15	dirty	6	
22 Jun	832	22,675	30	37%	11								1.85	14	dirty	9	
23 Jun	362	23,037											1.50	14	dirty	18	
24 Jun	956	23,993											1.30	14	dirty	19	lost radio contact
25 Jun	409	24,402	10	50%	5												
26 Jun	750	25,152											0.94	14	clearing	24	
27 Jun	309	25,461	14	43%	6								0.90	14.5	clear	18	
28 Jun	485	25,946	4	50%	2								0.86	14.5	clear	3	
29 Jun	255	26,201	7	29%	2								0.75	15.5	clear	10	
30 Jun	170	26,371	10	40%	4								0.70	10	clear		
1 Jul	494	26,865											0.66	16	clear	8	
2 Jul	144	27,009											0.59	18	clear	14	
3 Jul	467	27,476	10	40%	4								0.52	20	clear	15	
4 Jul	66	27,542											0.46	20	clear	6	
5 Jul	27	27,569											0.41	21	clear	12	
6 Jul	19	27,588											0.36	20	clear	3	
7 Jul	9	27,597											0.30	19	clear	3	

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## Appendix C5.–Page 3 of 4.

Date	Chinook salmon					Coho salmon					Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n	Sockeye salmon	Chum salmon	Pink salmon	Stage (ft)	Temp. (°C)	Clarity (relative)		
8 Jul	181	27,778										0.28	18	clear	1	
9 Jul	207	27,985										0.27	17	clear	12	
10 Jul	387	28,372	7	57%	4						2	0.24	18	clear	7	
11 Jul	278	28,650									0	0.24	18	clear	7	
12 Jul	64	28,714	5	20%	1				2		0	0.26		clear	0	therm. broken
13 Jul	211	28,925				6	6		0		0	0.24		clear	0	
14 Jul	260	29,185				11	17		2	1	0	0.22			0	
15 Jul	131	29,316				18	35		0	0	0	0.19	19	clear		
16 Jul	84	29,400				23	58		0	0	2	0.22	18	clear		
17 Jul	0	29,400				2	60		0	0	0	0.35	17	clear	6	
18 Jul	26	29,426				15	75		0	1	0	0.41	16.5	clear	7	
19 Jul	21	29,447				25	100		0	0	0	0.40	16	clear	0	
20 Jul	16	29,463				11	111		0	0	0	0.39	16	clear	0	
21 Jul	26	29,489				54	165	6	5	0	0	0.45	16	clear	2	
22 Jul	31	29,520				51	216		2	0	2	0.55	16	clear	2	
23 Jul	6	29,526				67	283	10	0	0	0	0.45	16	clear	7	
24 Jul	4	29,530				17	300		0	0	2		16	clear	9	
25 Jul	3	29,533				32	332		0	1	2	0.38	16	clear	5	
26 Jul	21	29,554				551	883	35	24	0	19	0.48	16	clear	2	water rising fast
27 Jul	6	29,560				21	904		9	0	6	1.98	15	s.cloudy	4	
28 Jul	6	29,566				192	1,096	48	12	0	2	1.46	15	s.cloudy	6	
29 Jul	14	29,580				134	1,230	16	1	2	13	1.30	15	s.cloudy	9	
30 Jul	8	29,588				179	1,409	10	1	0	17	1.15	15	clear	17	
31 Jul		29,588										2.85	15	dirty	18	weir underwater
1 Aug		29,588										3.40	15.5	dirty	30	weir underwater
2 Aug		29,588										3.60	15	dirty	7	weir underwater
3 Aug	8	29,596				148	1,557		0	10	35	2.10	15	cloudy	12	
4 Aug	6	29,602				128	1,685		0	10	96	1.60	16	clear	10	

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## Appendix C5.–Page 4 of 4.

Date	Chinook salmon					Coho salmon					Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n	Sockeye salmon	Chum salmon	Pink salmon	Stage (ft)	Temp. (°C)	Clarity (relative)		
5 Aug	6	29,608				135	1,820	10	0	0	93	1.33	16	clear	17	16 coho above weir
6 Aug	10	29,618				127	1,947	8	0	0	20	1.14	16.5	clear	6	7 coho harvested
7 Aug	7	29,625				380	2,327	22	1	0	64	1.06	16	clear	15	15 coho harvested
8 Aug	5	29,630				364	2,691	30	0	0	66	1.03	16	clear	4	43 coho harvested
9 Aug	7	29,637				447	3,138	30	0	0	27	1.13	15.5	clear	3	
10 Aug	4	29,641				407	3,545	30	0	0	28	1.03	15.5	clear	5	
11 Aug	2	29,643				354	3,899	4	0	0	108	0.95	15.5	clear	4	3 coho harvested
12 Aug	4	29,647				543	4,442	20	0	0	157	0.87	16	cloudy	5	water rising fast
13 Aug	0	29,647				30	4,472	30	0	0	5	2.24	16	muddy		water rising fast
14 Aug		29,647										3.10	16	4	10	weir underwater
15 Aug		29,647										3.50	16	4	13	weir underwater
16 Aug		29,647										3.00	16	1	8	weir underwater/coming down
17 Aug		29,647														weir underwater
18 Aug	0	29,647				3	4,475		1	0	0	1.80	17	1.5	8	
19 Aug	0	29,647				15	4,490		1	0	0	1.70	17	1.5	0	partial counts
20 Aug		29,647														
21 Aug	0	29,647				45	4,535		0	0	8	1.35	15			weir fish tight 13:30
22 Aug	0	29,647				6	4,541		0	0	0	1.25	15			
23 Aug	1	29,648				1	4,542		1	1	0	1.16	13	3	4	
24 Aug	0	29,648				3	4,545		1	0	0	0.96	14	3		
25 Aug	0	29,648				3	4,548		0	0	0	0.95	14	2	0	
26 Aug	1	29,649				15	4,563	4	0	0	3	1.44	13	2	1	water level rising
27 Aug	0	29,649				3	4,566									weir pulled
Totals		29,649	527	44%	234		4,566	313	63	26	777					

Appendix C6.—Deshka River weir passage data for 2000.

Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
1 Jun	0	0														0	weir fish tight at 4:30
2 Jun	368	368	2	50%	1								1.70	13		18	
3 Jun	960	1,328	10	20%	2								1.60	14		13	
4 Jun	652	1,980	20	20%	4							1	1.48	14		11	
5 Jun	2,254	4,234	22	50%	11							0	1.36	16		3	
6 Jun	1,757	5,991	40	50%	20							0	1.28	17		6	
7 Jun	312	6,303	20	75%	15							0	1.20	17	cloudy	7	
8 Jun	1,053	7,356	5	80%	4							0	1.10	17	clear	17	
9 Jun	36	7,392	20	65%	13							0	1.08	17	cloudy	25	
10 Jun	161	7,553	10	70%	7							0	0.98	16	clear	33	
11 Jun	411	7,964	10	70%	7							0	0.88	17	clear	24	
12 Jun	396	8,360	12	25%	3							1	0.84	17	clear	8	
13 Jun	360	8,720	10	40%	4							0	0.82	17	clear	16	
14 Jun	626	9,346	30	53%	16							0	0.82	17	clear	19	
15 Jun	472	9,818	18	56%	10							0	0.80	16	clear	8	
16 Jun	2,353	12,171	5	60%	3							0	0.68	16	clear	34	
17 Jun	870	13,041	10	20%	2							0	0.66	17	clear	20	
18 Jun	2,607	15,648	20	55%	11							0	0.60	17	clear	10	
19 Jun	1,126	16,774	20	55%	11							0	0.58	16	clear	10	
20 Jun	2,333	19,107	9	56%	5							0	0.60	16	clear	6	
21 Jun	1,524	20,631	20	55%	11							0	0.60	16	clear	10	
22 Jun	803	21,434	15	60%	9							1	0.60	16	clear	8	
23 Jun	693	22,127	16	75%	12							0	0.58	16	clear	16	
24 Jun	855	22,982	27	63%	17							0	0.56	16	clear	21	
25 Jun	906	23,888	10	10%	1							0	0.54	16	clear	20	
26 Jun	1,349	25,237	7	43%	3							0	0.52	16	clear	9	
27 Jun	841	26,078										0	0.40	16	clear	10	

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	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
28 Jun	1,239	27,317	25	64%	16							0	0.46	16	clear	12	
29 Jun	1,010	28,327	9	44%	4							0	0.54	16	clear	10	
30 Jun	1,670	29,997	20	60%	12							0	1.08	16	dirty	18	
1 Jul	823	30,820	20	50%	10							0	1.18	18	dirty		
2 Jul	855	31,675	15	27%	4							0	1.08	16	clear	12	
3 Jul	86	31,761	10	50%	5							0	0.90	16	clear	9	
4 Jul	117	31,878	10	60%	6							0	0.70	17	clear	7	
5 Jul	338	32,216	9	67%	6	1	1	1				0	0.60	16	clear	5	first grizzly
6 Jul	263	32,479	3	0%	0	5	6					0	0.70	16	clear	3	
7 Jul	429	32,908	10	60%	6	41	47				29	1	0.66	17	clear	6	
8 Jul	109	33,017	6	67%	4	4	51	1			0	0	0.60	17	clear	5	
9 Jul	161	33,178	16	63%	10	13	64				0	0	0.58	18	clear	6	
10 Jul	236	33,414	8	50%	4	34	98		1		1	0	0.52	17	clear	5	
11 Jul	54	33,468				10	108	2	1		1	0	0.48	17	clear	2	one coho tagged
12 Jul	54	33,522	28	54%	15	10	118	3	0		3	0	0.44	17	clear	0	3 coho tagged
13 Jul	393	33,915				31	149		0		4	0	0.42	17	clear	3	
14 Jul	77	33,992				6	155		0		13	3	0.40	18	clear	7	
15 Jul	51	34,043				4	159		0		98	0	0.48	18	clear	5	
16 Jul	605	34,648				205	364	13	0		328	1	1.00	16	dirty	0	tagged 5 coho
17 Jul	107	34,755				431	795	37	1		330	0	1.20	16	dirty	0	water at 2.0 this am
18 Jul	12	34,767				394	1,189	63	0		231	0	2.00	16	dirty	1	
19 Jul	45	34,812				2,369	3,558	30	1		1,037	0	1.80	16	dirty	1	
20 Jul	4	34,816				282	3,840	25	0		236	0	1.62	16	dirty	4	
21 Jul	11	34,827				397	4,237		2		3,371	0	1.18	16	dirty	8	
22 Jul	14	34,841				121	4,358	10	0		8,507	0	1.15	16	dirty	9	
23 Jul	12	34,853				375	4,733	20	6		14,968	0	1.18	16	dirty	7	

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Appendix C6.–Page 3 of 4.

Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem. %	Fem. no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
24 Jul	11	34,864				368	5,101	20	3		12,703	0	1.34	16	dirty	6	
25 Jul	3	34,867				344	5,445	30	0		26,201	0	1.35	16	dirty	5	
26 Jul	3	34,870				601	6,046	30	6		69,319	0	1.28	16	dirty	6	
27 Jul	12	34,882				321	6,367	21	4		85,724	0	1.18	16	fair	7	
28 Jul	7	34,889				252	6,619	20	5	1	225,180	0	1.00	16	fair	25	
29 Jul	9	34,898				927	7,546	30	4	0	160,700	0	0.86	15	fair	25	
30 Jul	7	34,905				1,050	8,596	40	2	0	65,900	0	0.88	15	clear	12	
31 Jul	3	34,908				475	9,071	30	0	0	142,700	0	0.88	15	good	7	
1 Aug	8	34,916				241	9,312	30	0	0	120,500	0	0.86	15	good	10	
2 Aug	21	34,937				639	9,951	30	1	0	83,700	0	0.78	15	good	5	
3 Aug	11	34,948				738	10,689	40	1	0	31,100	0	0.78	15	good	6	
4 Aug	20	34,968				433	11,122	30	0	1	39,992	0	0.80	16	good	14	
5 Aug	13	34,981				406	11,528	20	0	0	31,500	0	0.86	15	good	19	
6 Aug	94	35,075				3,203	14,731	10	0	0	39,200	0	0.78	15	good	11	
7 Aug	31	35,106				342	15,073	16	0	342	30,437	0	0.78	15	good	6	
8 Aug	22	35,128				831	15,904	20	0	0	30,100	0	0.76	15	good	6	
9 Aug	15	35,143				371	16,275	20	0	0	10,138	0	0.68	15	good	7	
10 Aug	16	35,159				654	16,929	11	0	0	16,246	1	0.56	15	good	8	1 pike
11 Aug	2	35,161				342	17,271	10	0	0	6,563	0	0.50	15	good	16	
12 Aug	10	35,171				1,150	18,421	10	0	0	7,527	0	0.46	15	good	3	
13 Aug	26	35,197				789	19,210	10	0	0	5,152	0	0.38	15	good	8	
14 Aug	13	35,210				773	19,983	10	0	0	3,361	0	0.38	15	good	8	
15 Aug	5	35,215				330	20,313	10	0	1	1,212	0	0.36	14	good	3	
16 Aug	8	35,223				234	20,547	10	0	0	1,166	0	0.35	14	good	5	
17 Aug	4	35,227				211	20,758	20	0	0	1,104	0	0.35	14		3	
18 Aug	2	35,229				162	20,920	20	0	0	367	0	0.30	14		6	

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Date	Chinook salmon					Coho salmon					Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>	Sockeye salmon	Chum salmon	Pink salmon	Stage (ft)	Temp. (°C)	Clarity (relative)		
19 Aug	2	35,231				524	21,444	10	0	0	561	0.28	14		3	
20 Aug	3	35,234				313	21,757	20	0	0	559	0.26	14		3	
21 Aug	2	35,236				132	21,889		0	0	300	0.24	14		1	
22 Aug	1	35,237				200	22,089	11	0	0	301	0.24	14		3	
23 Aug	1	35,238				157	22,246	10	0	1	80	0.28	14			
24 Aug	1	35,239				221	22,467	10	0	0	107	0.28	14		3	
25 Aug	0	35,239				333	22,800	10	0	1	84	0.29	14			
26 Aug	0	35,239				178	22,978	10	0	1	56	0.30	14			
27 Aug	1	35,240				420	23,398	10	0	0	51	0.32	13			
28 Aug	0	35,240				444	23,842	10	0	0	30	0.40	13		1	
29 Aug	0	35,240				495	24,337	10	0	0	30	0.44	13		2	water at 0.52; rising
30 Aug	1	35,241				816	25,153	10	0	0	18	0.58	13		1	water at 0.71 10 PM
31 Aug	1	35,242				326	25,479	10	0	0	8	0.98	13	dirty	6	
1 Sep						159	25,638	10	0	0	5	0.88	13		5	
2 Sep						20	25,658	10	0	1	1	0.78	13		7	
3 Sep						283	25,941	10	0	0	0	0.64	13			
4 Sep						56	25,997		0	1	0	0.58	13			
5 Sep						24	26,021		0	1	0	0.52	13			
6 Sep						8	26,029		0	0	0	0.50	13		3	
7 Sep						107	26,136		0	0	0	0.60	13		0	
8 Sep						105	26,241		0	0	3	0.70	12		5	
9 Sep						32	26,273		0	1	5	0.60	12		8	
10 Sep						1	26,274		0	0	0	0.48	12		0	
11 Sep						7	26,281		0	3	0	0.52	11			
12 Sep						34	26,315		0	2	0	0.68	10			
13 Sep						72	26,387		0	4	0	1.00	10		1	
14 Sep																weir pulled
Totals		35,242	577	53%	304		26,387	914	38	361	0	12			816	

Appendix C7.—Deshka River weir passage data for 2001.

Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
4 Jun	0	0															fish tight at 4 PM
5 Jun	371	371	21	76%	16								1.40	15	fair	7	
6 Jun	179	550	10	50%	5								1.38	14	fair	5	
7 Jun	951	1,501	10	60%	6							1	1.36	14	fair	10	
8 Jun	1,296	2,797	30	57%	17							1	1.20	15	good	17	
9 Jun	1,227	4,024	30	83%	25							0	1.30	15	good	44	
10 Jun	1,236	5,260	30	73%	22							0		15	good	16	bait decision
11 Jun	1,718	6,978	10	70%	7							0	1.10	15	good	14	
12 Jun	833	7,811	10	70%	7							0	1.00	15	good	11	bait effective
13 Jun	872	8,683	10	50%	5							0	1.02	15	good	10	
14 Jun	385	9,068	12	83%	10							1	1.00	15	excellent	12	1 pike 560
15 Jun	667	9,735	11	55%	6							0	0.98	15	excellent	21	
16 Jun	444	10,179	22	50%	11							1	0.96	16	excellent	33	1 pike 475
17 Jun	1,005	11,184	17	76%	13							0	0.78	16	excellent	21	
18 Jun	1,054	12,238	28	4%	1							0	0.76	16	excellent	11	
19 Jun	1,266	13,504	32	53%	17							0	0.74	16	excellent	13	2 rainbows
20 Jun	801	14,305	0		0							1	0.60	16	excellent	15	
21 Jun	416	14,721	11	45%	5							0	0.58	16	excellent	17	
22 Jun	355	15,076	20	60%	12							0	0.56	18	excellent	25	
23 Jun	120	15,196	20	70%	14							0	0.52	20	excellent	21	
24 Jun	467	15,663	10	70%	7							1	0.49	20	excellent	6	
25 Jun	563	16,226	30	63%	19							0	0.42	20	excellent	6	
26 Jun	338	16,564	23	57%	13							0	0.39	20	excellent	7	2 rainbows
27 Jun	90	16,654	24	71%	17							0	0.41	20	excellent	3	
28 Jun	4	16,658	4	50%	2							0	0.38	20	excellent	7	5 rafts
29 Jun	181	16,839	19	74%	14							0	0.32	20	excellent	11	2 rafts
30 Jun	615	17,454	42	60%	25							0	0.28	20	excellent	12	1 rainbow and 3 rafts

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Date	Chinook salmon					Coho salmon				Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir	General comments
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>	Stage (ft)					Temp. (°C)	Clarity (relative)	(no.)		
1 Jul	1,149	18,603	37	46%	17								0	0.26	20	excellent	5	2 rainbows
2 Jul	2,570	21,173	30	47%	14								1	0.24	20	excellent	5	2 rainbows
3 Jul	2,201	23,374	2	0%	0								1	0.22	19	excellent	6	3 rainbows
4 Jul	1,263	24,637	29	45%	13								0	0.28	19	excellent	7	
5 Jul	395	25,032	11	36%	4				1				0	0.40	20	excellent	2	
6 Jul	1,004	26,036	20	40%	8				0				0	0.58	17	excellent	6	1 rainbow
7 Jul	1,477	27,513	20	35%	7				0				0	0.70	17	excellent	13	
8 Jul	175	27,688	10	20%	2				0				0	0.56	17	excellent	1	
9 Jul	6	27,694	6	50%	3				0				0	0.46	17	excellent	1	1 rainbow
10 Jul	13	27,707	10	50%	5				0				0	0.42	17	excellent	4	
11 Jul	239	27,946	20	20%	4	5	5		0				0	0.54	17	good	1	
12 Jul	351	28,297	11	55%	6	0	5		1				0	0.80	17	good	4	stage 1.68 at noon
13 Jul	152	28,449	5	80%	4	10	15		6				0	1.66	16	poor	9	
14 Jul	32	28,481	0		0	0	15		0				0	1.18	16	poor	2	
15 Jul	14	28,495	0		0	0	15		0				0	0.96	16	good	2	
16 Jul	14	28,509	10	50%	5	2	17		0		1	0	0.78	16	good	0		
17 Jul	47	28,556	0		0	2	19		0		0	0	0.72	15	good	0		
18 Jul	6	28,562	0		0	6	25		0		0	0	0.70	16	good	0		
19 Jul	34	28,596	0		0	6	31	2	2		3	0	0.52	16	good	3		
20 Jul	69	28,665	0			36	67	4	10		205	0	0.59	16	good	3		
21 Jul	30	28,695	2	0%	0	224	291	10	16		584	0	0.85	17	good	4		
22 Jul	26	28,721	0			344	635	19	12		529	0	1.20	16	fair	3		
23 Jul	10	28,731	0		0	108	743	20	6		36	0	1.06	17	fair	1		
24 Jul	6	28,737	1	0%	0	146	889	10	2		47	0	1.12	16.5	fair	5		
25 Jul	4	28,741				23	912		1		33	0	0.98	17	fair	5		
26 Jul	13	28,754				127	1,039	0	6		133	0	0.90	17	poor	6		
27 Jul	5	28,759				195	1,234	15	1		236	0	0.90	17	fair	18		

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Date	Chinook salmon					Coho salmon					River water			Boats through weir	General comments		
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>	Sockeye salmon	Chum salmon	Pink salmon	Northern pike	Stage (ft)	Temp. (°C)		Clarity (relative)	(no.)
28 Jul	23	28,782				352	1,586	20	7		316	0	0.98	18	fair	11	
29 Jul	13	28,795				424	2,010	10	9		402	0	0.96	17	fair	6	
30 Jul	9	28,804				19	2,029	10	0		6	0	0.94	17	fair	4	
31 Jul	3	28,807				568	2,597	10	9		236	0	0.96	16	poor	10	water rising
1 Aug	8	28,815				314	2,911	20	0	1	257	0	1.84	15	bad	11	2.46 at midnight
2 Aug	5	28,820				175	3,086	20	0	0	27	0	2.00	15	bad	4	
3 Aug	10	28,830				1,564	4,650	20	0	1	97	0	1.50	15	bad	9	
4 Aug	12	28,842				4,606	9,256	20	0	0	536	0	1.40	15	OK	17	
5 Aug	12	28,854				2,059	11,315	135	0	1	61	0	2.20	15	poor	8	
6 Aug	5	28,859				3,786	15,101	39	1	0	87	0	1.78	15	bad	7	4 rafts
7 Aug	2	28,861				1,012	16,113	0	0	1	52	0	1.32	16	OK	5	
8 Aug	3	28,864				371	16,484	20	1	0	50	0	1.15	16	good	8	55 tags out
9 Aug	3	28,867				159	16,643	10	0	0	29	0	0.95	16	fair	3	50 tags out
10 Aug	9	28,876				330	16,973	20	0		143	0	0.80	16			
11 Aug	14	28,890				303	17,276	20	0		104	0	0.74	16			
12 Aug	23	28,913				299	17,575	10	0		84	0	0.84	17.5			
13 Aug	12	28,925				334	17,909	10	0		73	1	0.68	17	good	7	
14 Aug	3	28,928				943	18,852	10	0	0	53	0	0.64	18	good	8	
15 Aug	2	28,930				130	18,982	10	0	1	19	3	0.58	17.5	good	5	
16 Aug	14	28,944				1,502	20,484	10	0	0	45	1	0.60	17.5	good	3	
17 Aug	16	28,960				5,256	25,740	60	0	0	109	0	1.32	17	fair	6	
18 Aug	8	28,968				1,511	27,251	101	0	0	24	0	1.86	17	bad	8	
19 Aug	7	28,975				535	27,786	41	0	0	18	0	1.90	16.5	bad	9	
20 Aug	8	28,983				521	28,307	10	0	0	9	0	1.90	16.5	bad	3	
21 Aug	4	28,987				325	28,632	10	0	0	4	0	2.00	16	bad	4	
22 Aug	5	28,992				152	28,784	10	0	1	5	0	1.60	16	fair	1	
23 Aug	1	28,993				52	28,836	0	0	0	7	1	1.56	16	fair	3	

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Date	Chinook salmon					Coho salmon					Northern pike	River water			Boats through weir (no.)	General comments	
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>	Sockeye salmon	Chum salmon		Pink salmon	Stage (ft)	Temp. (°C)			Clarity (relative)
24 Aug	4	28,997				27	28,863	10	0	2	14	0	1.06	16	fair	11	
25 Aug	2	28,999				44	28,907	10	1	2	6	0	0.98	16	fair	6	
26 Aug	1	29,000				121	29,028	10	1	0	6	0	1.20	16	fair	6	
27 Aug	0	29,000				60	29,088	10	0	0	0	0	1.01	15.5	fair	3	
28 Aug	0	29,000				18	29,106	0	0	0	0	0	0.90	15.5	good	1	
29 Aug	3	29,003				9	29,115	0	1	2	0	1	0.81	14.5	good	0	
30 Aug	0	29,003				30	29,145	4	0	0	0	1	0.80	14.5	good	2	
31 Aug	0	29,003				138	29,283	10	0	0	0	0	0.80	14.5	good	8	
1 Sep	0	29,003				109	29,392		0	0	0	0	0.80	14.5	good	9	
2 Sep	0	29,003				96	29,488		0	0	1	0	0.78	14.5	good	1	plus 1 raft
3 Sep	1	29,004				128	29,616		0	1	1	0	0.76	14.5	good	1	
4 Sep						109	29,725		0	0	0	0	0.72	14.5	good	1	
5 Sep						100	29,825		0	0	0	0	1.10	14.5	fair		weir partially submerged
6 Sep						0	29,825										weir partially submerged
7 Sep						27	29,852		0	0	0	0	3.35	12	poor	0	
8 Sep						32	29,884		0	0	0	0	2.64	12	fair	5	
9 Sep						15	29,899		0	0	0	0	2.05	11	fair	7	
10 Sep						16	29,915		0	3	0	1	1.72	10	fair	3	
11 Sep						0	29,915					0	1.42	10.5	fair	4	
12 Sep						12	29,927					0	1.25	11	fair		
13 Sep																	weir pulled
Totals		29,004	710	55%	388		29,927	790	94	16	4,688	17					

Appendix C8.—Deshka River weir passage data for 2002.

Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
29 May															good		installed weir-1 day of diving
30 May	1	1											1.42		good		installed weir-fish tight 4 PM
31 May	82	83											1.40	15	good	9	
1 Jun	5	88	3	100%	3								1.38	15	good	7	
2 Jun	4	92	4	75%	3							3	1.28	14	good	5	
3 Jun	117	209	7	100%	7							0	1.22	14	good	5	
4 Jun	199	408	20	45%	9							1	1.18	15	good	3	looks like big fish this year
5 Jun	277	685	20	55%	11							0	1.20	15	fair	3	
6 Jun	72	757	13	62%	8							0	1.18	15	fair	2	
7 Jun	291	1,048	11	45%	5							2	1.42	15	fair	0	
8 Jun	315	1,363	23	57%	13							0	1.30	15	fair	18	
9 Jun	712	2,075	23	39%	9							0	1.34	15	fair	10	
10 Jun	1,818	3,893	16	44%	7							0	1.18	14	fair	11	
11 Jun	1,498	5,391	11	64%	7							0	1.14	14	fair	12	
12 Jun	1,502	6,893	10	50%	5							0	1.08	16	fair	15	
13 Jun	1,521	8,414	20	45%	9							0	1.02	16	good	14	
14 Jun	1,606	10,020	20	45%	9							0	0.96	16	excellent	23	
15 Jun	632	10,652	20	60%	12							0	0.88	17	excellent	21	
16 Jun	537	11,189	10	40%	4							1	0.82	18.5	excellent	13	
17 Jun	665	11,854	20	30%	6							0	0.75	18	excellent	9	
18 Jun	271	12,125	10	60%	6							1	0.72	18	excellent	8	2 floaters
19 Jun	1,441	13,566	30	47%	14							0	0.66	18	excellent	10	2 floaters
20 Jun	1,551	15,117	17	59%	10							0	0.66	18	excellent	6	
21 Jun	578	15,695	30	57%	17							0	0.66	16	excellent	14	1 floater
22 Jun	1,206	16,901	21	43%	9						2	0	0.70	16	excellent	11	2 floaters

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Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
23 Jun	644	17,545	20	50%	10						0	0	0.66	16	excellent	13	2 floaters
24 Jun	1,183	18,728	19	53%	10						0	0	0.64	18	excellent	8	2 floaters
25 Jun	1,656	20,384	20	50%	10						0	0	0.64	18.5	excellent	4	
26 Jun	630	21,014	7	57%	4						0	0	0.64	18	excellent	5	2 floaters
27 Jun	1,018	22,032	10	40%	4						1	1	0.66	17	excellent	8	
28 Jun	337	22,369	8	75%	6						0	1	0.60	17	excellent	8	8 floaters
29 Jun	122	22,491	5	20%	1						0	0	0.56	17	excellent	9	
30 Jun	656	23,147	5	20%	1						0	0	0.48	19.5	excellent	3	2 floaters
1 Jul	917	24,064	10	60%	6						0	0	0.42	19	excellent	6	
2 Jul	547	24,611	10	30%	3						0	0	0.40	18	excellent	5	
3 Jul	347	24,958	20	30%	6						0	1	0.48	17.5	excellent	6	
4 Jul	618	25,576	10	50%	5						0	0	0.46	17	excellent	8	
5 Jul	295	25,871	10	90%	9						0	0	0.50	17	excellent	9	
6 Jul	419	26,290	16	38%	6	2	2				11	0	0.56	17	excellent	9	
7 Jul	533	26,823	17	47%	8	0	2				2	0	0.56	17	excellent	5	
8 Jul	87	26,910	5	40%	2	0	2				9	0	0.54	17	excellent	4	
9 Jul	181	27,091	10	60%	6	0	2				15	0	0.40	17	excellent	0	3 rafts, 4 canoes
10 Jul	63	27,154	9	44%	4	3	5				6	0	0.34	17	excellent	0	0 boats
11 Jul	5	27,159	3	33%	1	0	5				22	0	0.32	17	excellent	8	
12 Jul	143	27,302	18	50%	9	0	5				108	0	0.28	18	excellent	8	
13 Jul	706	28,008	10	90%	9	28	33		1		1,111	0	0.26	18	excellent	8	1 floater, 1 rainbow, last day of king salmon season
14 Jul	304	28,312	10	60%	6	5	38		1		1,130	1	0.24	18	excellent	3	2 floaters
15 Jul	59	28,371	10	50%	5	6	44		0		771	0	0.22	18	excellent	2	
16 Jul	79	28,450				22	66		2		1,855	0	0.17	18	excellent	3	

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Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
17 Jul	126	28,576	5	20%	1	6	72	2	2		7,645	0	0.15	18	excellent	3	
18 Jul	181	28,757				24	96		3		16,678	0	0.13	19	excellent	2	
19 Jul	34	28,791				19	115		3		14,670	0	0.18	19	excellent	13	
20 Jul	26	28,817				80	195	3	1		12,686	0	0.20	19	excellent	10	
21 Jul	37	28,854				255	450	5	2		39,872	0	0.26	19	excellent	5	
22 Jul	49	28,903				749	1,199	15	5		55,573	0	0.18	19	excellent	7	
23 Jul	20	28,923				822	2,021	20	3		45,162	0	0.14	20	excellent	4	
24 Jul	12	28,935				340	2,361	30	5		30,954	0	0.14	20	excellent	5	
25 Jul	29	28,964				409	2,770	10	0	1	53,040 <sup>a</sup>	1	0.16	19	excellent	3	one floater
26 Jul	25	28,989				561	3,331	20	4	0	76,920 <sup>a</sup>	0	0.16	18	excellent	6	pinks are now being estimated
27 Jul	17	29,006				1132	4,463	20	2	0	77,700 <sup>a</sup>	1	0.26	18	excellent	12	1 radio-tagged coho; 2 canoes
28 Jul	8	29,014				1502	5,965	20	1	1	89,135 <sup>a</sup>	0	0.44	16	excellent	5	1 canoe
29 Jul	51	29,065				1616	7,581	20	0	0	102,560 <sup>a</sup>	0	0.48	15	excellent	2	pinks are now being estimated
30 Jul	10	29,075				835	8,416	20	0	0	80,000 <sup>a</sup>	0	0.36	17	excellent	1	1 rainbow trout
31 Jul	6	29,081				868	9,284	10	0	0	76,500 <sup>a</sup>	0	0.24	18	excellent	4	
1 Aug	10	29,091				591	9,875	12	0	0	39,280 <sup>b</sup>	0	0.14	18	excellent	2	
2 Aug	10	29,101				164	10,039	6	0	0	31,280 <sup>b</sup>	0	0.04	18	excellent	9	
3 Aug	7	29,108				57	10,096		0	0	15,400 <sup>b</sup>	0	0.02	19	excellent	6	
4 Aug	7	29,115				92	10,188	4	0	0	19,480 <sup>b</sup>	0	0.00	20	excellent	8	
5 Aug	12	29,127				37	10,225	3	0	0	20,360 <sup>b</sup>	0	-0.06	20	excellent	3	
6 Aug	21	29,148				22	10,247	2	0	0	14,100 <sup>b</sup>	1	-0.08	19	excellent	2	
7 Aug	48	29,196				112	10,359	2	1	0	14,920 <sup>b</sup>	0	0.34	17	excellent	0	
8 Aug	49	29,245				2075	12,434	27	0	0	6,120 <sup>b</sup>	0	1.00	17	poor	2	

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Date	Chinook salmon					Coho salmon					River water			Boats through weir	General comments		
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n	Sockeye salmon	Chum salmon	Pink salmon	Northern pike	Stage			Temp. (°C)	Clarity (relative)
9 Aug	10	29,255				7085	19,519	60	0	4	82	0	2.6	15	poor	6	1.6 @ 9:40 AM, 8 panels under, couple of fish seen going over the weir
10 Aug	15	29,270				1010	20,529	30	0	1	62	0	3.06	15	poor	5	1/3 weir under, 6" to 10"
11 Aug	5	29,275				293	20,822	10	0	1	46	0	2.7	14	poor	6	weir partly submerged, 6" to 12"
12 Aug	10	29,285				204	21,026	8	0	1	36	0	2.98	14	poor	5	weir partly submerged, 12" to 16" under
13 Aug	8	29,293				353	21,379	4	0	0	91	0	3.14	14	poor	2	peak-3.18, weir partly submerged, 4-5 panels 18" to 20"
14 Aug	5	29,298				242	21,621	7	0	1	45	0	2.9	14	poor	3	still have 6 panels under 6" to 12"
15 Aug	4	29,302				94	21,715	2	0	5	197	0	2.1	17	poor	2	fish tight again, 1 raft
16 Aug	5	29,307				319	22,034	7	0	1	140	0	1.72	14	poor	8	6 floaters
17 Aug	7	29,314				237	22,271	4	0	2	90	0	1.45	14	poor	10	7 floaters
18 Aug	16	29,330				153	22,424	2	0	7	45	0	1.3	18	poor	8	3 floaters
19 Aug	20	29,350				109	22,533	2	0	2	80	0	1.18	15	poor	6	
20 Aug	33	29,383				213	22,746	4	0	2	109	0	1.18	14	poor	1	
21 Aug	18	29,401				691	23,437	7	0	2	98	0	1.55	14	poor	6	
22 Aug	12	29,413				214	23,651	3	0	1	27	0	3	14	poor	5	weir down

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Date	Chinook salmon					Coho salmon					N. pike	River water			Boats thru weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n	Sockeye salmon	Chum salmon	Pink salmon	Stage (ft)	Temp. (°C)	Clarity (rel.)		
23 Aug	4	29,417				32	23,683	2	0	2	4	3.52	14	poor	4	counted some fish through side pickets, and dipped some out of cage
24 Aug	0	29,417				41	23,724	5	0	1	2	3.22	14	poor	2	8 panels 6" under water, 1 floater
25 Aug	2	29,419				44	23,768	5	0	0	2	2.42	14	poor	1	fish tight @ 9:30 PM
26 Aug	4	29,423				53	23,821	0	0	0	7	2.04	14	poor		
27 Aug	0	29,423				55	23,876	2	0	1	3	1.84	14	poor		petersen disk 407 & transmitter from angler
28 Aug	0	29,423				77	23,953	4	0	2	2	1.58	14	fair		
29 Aug	2	29,425				57	24,010		2	2	3	1.38	14	poor	2	
30 Aug	1	29,426				65	24,075		0	0	1	1.34	14	poor	7	
31 Aug	0	29,426				31	24,106		0	0	0	1.48	14	poor	8	1 floater
1 Sep	1	29,427				75	24,181		1	5	4	1.56	14	poor	6	
2 Sep	1	29,428				53	24,234		0	4	4	1.75	13	poor	10	
3 Sep						35	24,269	7	0	2	1	1.86	13	poor	3	2.1 @ peak
4 Sep						33	24,302		0	2	0	1.5	13	fair	4	
5 Sep						23	24,325		0	1	0	1.3	13	fair		
6 Sep						88	24,413	2	0	4	0	1.34	13	fair	2	
7 Sep						42	24,455		0	3	0	1.74	13	poor	2	
8 Sep						144	24,599	2	0	8	0	2.66	13	poor	4	
9 Sep						13	24,612		0	0	0	2.58	13	poor	0	began pulling weir at 10 AM
10 Sep																
11 Sep																finished pulling weir
Totals		29,428	626	50%	315		24,612	430	39	69	946,259	16				

<sup>a</sup> Pink salmon count estimated by number of pink salmon/minute × total minutes, until a disruption in passage occurred.

<sup>b</sup> Pink salmon counted by tens.

Appendix C9.–Deshka River weir passage data for 2003.

Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
21 May																	installed all panels and trap
22 May	21	21														6	fish tight at 2 PM
23 May	147	168										4	1.28	13	good	7	
24 May	108	276										1	1.22	13	good	15	
25 May	210	486										2	1.18	13	good	5	
26 May	127	613	10	60%	6							2	1.08	13	good	5	
27 May	237	850										1	1.04	13	good	4	5 rainbows
28 May	678	1,528	10	80%	8							3	1.16	12.5	good	4	2 rainbows
29 May	490	1,528										0	1.18	12.5	good	4	2 rainbows
30 May	381	2,399	30	73%	22							0	1.06	12.5	good	12	3 rainbow, 11 long nose suckers
31 May	340	2,739										1	1.00	13.5	good	17	2 rainbows, 14 longnose suckers
1 Jun	708	3,447										0	1.07	14	good	12	1 rainbow, 3 suckers
2 Jun	454	3,901	11	55%	6							0	1.48	14	good	5	2 rainbows, 1 longnose sucker
3 Jun	149	4,050	10	30%	3							0	1.36	13.5	good	5	3 rainbow
4 Jun	28	4,078										0	1.20	14	good	8	1 rainbow, 5 long nose suckers
5 Jun	149	4,227										0	1.10	14.5	good	7	
6 Jun	130	4,357										1	1.00	14.5	good	17	
7 Jun	238	4,595										0	1.02	13	fair	29	1 rainbow
8 Jun	1,088	5,683	10	60%	6							0	1.03	13.5	fair	16	
9 Jun	1,315	6,998	20	70%	14							0	1.00	13.5	fair	6	
10 Jun	1,253	8,251	20	30%	6							0	0.96	15	good	8	1 rainbow

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Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
11 Jun	1,387	9,638	20	45%	9							0	0.90	15	good	12	
12 Jun	1,471	11,109	14	57%	8							0	0.94	17	good	18	
13 Jun	2,060	13,169	20	35%	7							0	0.94	18	good	14	2 rainbow
14 Jun	3,014	16,183	30	47%	14							0	0.85	17.5	good	18	8 rainbow
15 Jun	1,468	17,651	10	50%	5							0	0.82	17	good	14	
16 Jun	2,345	19,996	30	43%	13							0	0.94	17	good	8	
17 Jun	1,141	21,137	15	60%	9							0	0.96	16.5	good	14	
18 Jun	1,014	22,151	10	40%	4							0	0.96	16	good	15	
19 Jun	2,151	24,302	20	50%	10							1	0.81	16	good	15	5 floaters
20 Jun	2,732	27,034	30	27%	8							0	0.76	17	good	23	
21 Jun	1,658	28,692	20	35%	7							0	0.74	17	good	18	1 rainbow
22 Jun	1,874	30,566	20	50%	10							0	0.72	17	good	9	2 floaters
23 Jun	1,065	31,631	20	30%	6							1	0.70	17	good	5	
24 Jun	1,098	32,729	20	25%	5							2	0.68	17	good	12	lots 1 ocean fish in AM
25 Jun	434	33,163	20	25%	5							0	0.64	17	good	10	1 floater-lots 1 ocean. 5 ks morts
26 Jun	725	33,888	15	40%	6							0	0.60	17	good	11	2 rainbow, 2 suckers, 4 floaters
27 Jun	242	34,130	22	45%	10							0	0.60	17	good	13	6 rainbow, 3 suckers, 3 floaters
28 Jun	1,057	35,187	20	45%	9							1	0.62	17	good	12	4 rainbow, 4 suckers
29 Jun	931	36,118	20	40%	8							0	0.60	17	good	11	5 rainbow, 6 suckers
30 Jun	679	36,797	11	55%	6							6	0.56	17	good	5	7 rainbow, 9 suckers
1 Jul	542	37,339	8	50%	4							0	0.48	18	good	7	5 rainbow, 6 suckers

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Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats thru weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
2 Jul	71	37,410			0							0	0.54	17	good	3	4 rainbow, 6 suckers
3 Jul	1,119	38,529	20	30%	6						1	0	1.00	17	poor	8	
4 Jul	54	38,583									0	0	2.47	15	bad	15	
5 Jul	169	38,752	10	20%	2						0	0	1.78	17	poor	10	
6 Jul	103	38,855									0	0	1.38	18	poor	5	
7 Jul	139	38,994							1		0	0	1.07	19	good	1	
8 Jul	189	39,183	10	20%	2	2	2		2	0	0	0	0.91	19	good	6	
9 Jul	88	39,271				0	2		0	0	0	0	0.88	19	good	6	
10 Jul	12	39,283				1	3		0	0	0	0	0.74	19	good	3	
11 Jul	24	39,307				0	3		0	0	0	0	0.60	19	good	9	
12 Jul	62	39,369				8	11		0	0	0	0	0.58	20	good	9	
13 Jul	78	39,447				5	16		0	0	0	0	0.54	20	good	6	
14 Jul	22	39,469				9	25		0	0	1	0	0.48	20	good	2	
15 Jul	18	39,487				0	25		0	0	0	0	0.38	20	good	0	
16 Jul	8	39,495				0	25		0	0	0	0	0.36	18	good	1	
17 Jul	3	39,498				0	25		0	0	0	0	0.38	17.5	good		1 raft/water level 2.3 AM
18 Jul	0	39,498				0	25		0	0	0	0	2.46	15	bad	5	
19 Jul	0	39,498				0	25		0	0	0	0	2.98	15	bad	8	
20 Jul	2	39,500				0	25		0	0	0	0	2.28	15	bad	4	
21 Jul	5	39,505	4	25%	1	7	32	7	2	0	4	0	1.52	17	poor	3	
22 Jul	17	39,522				16	48		1	0	5	0	1.24	17	good	2	
23 Jul	22	39,544				107	155		0	0	40	0	1.10	17	good	1	
24 Jul	7	39,551				55	210	6	4	0	35	0	1.00	17	good	2	
25 Jul	17	39,568				346	556	12	13	0	352	0	0.92	17	good	9	
26 Jul	36	39,604				707	1,263	17	12	1	1,399	0	1.02	16	poor	16	
27 Jul	14	39,618				396	1,659	15	3	6	1,483	0	0.98	16	poor	9	

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Appendix C9.—Page 4 of 5.

	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats through weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity (relative)		
28 Jul	12	39,630				936	2,595	30	3	2	926	0	1.02	16	poor	5	water 1.78 @ 11:30 PM
29 Jul	12	39,642				1,305	3,900	20	4	2	428	0	2.40	15	poor	4	
30 Jul	10	39,652				609	4,509	8	8	5	167	0	2.74	15	poor	7	
31 Jul	20	39,672				987	5,496		2	3	44	0	2.18	15	poor	6	
1 Aug	36	39,708				756	6,252	29	2	2	67	0	1.73	15.5	poor	22	
2 Aug	6	39,714				1,085	7,337	20	4	7	326	0	1.45	16	poor	14	
3 Aug	13	39,727				1,026	8,363	20	2	8	511	0	1.20	16	poor	10	
4 Aug	7	39,734				331	8,694		0	4	82	0	1.03	16	good	9	
5 Aug	16	39,750				453	9,147	14	3	4	183	0	0.94	16	good	5	
6 Aug	17	39,767				510	9,657	10	5	6	297	0	0.88	16	good	4	
7 Aug	12	39,779				452	10,109	6	0	4	390	0	0.78	16	good	8	
8 Aug	6	39,785				241	10,350	9	0	1	418	0	0.71	17	good	17	1 rainbow trout
9 Aug	4	39,789				337	10,687	10	0	1	514	0	0.65	18	good	20	
10 Aug	11	39,800				145	10,832	6	1	1	247	0	0.58	19	good	15	
11 Aug	11	39,811				101	10,933		0	1	110	1	0.56	18	good	3	
12 Aug	15	39,826				242	11,175	10	4	2	236	0	0.70	17	good	2	
13 Aug	34	39,860				1,487	12,662	29	0	10	714	0	1.10	16	poor	7	
14 Aug	35	39,895				2,258	14,920	40	0	13	108	0	1.92	15	poor	8	
15 Aug	52	39,947				788	15,708	30	0	3	12	0	2.22	15	poor	13	
16 Aug	20	39,967				152	15,860		0	1	8	0	1.94	15	poor	12	2 canoes, 1 raft
17 Aug	15	39,982				377	16,237	13	0	2	6	0	2.26	15	poor	1	1 canoe; much of weir underwater
18 Aug	5	39,987				134	16,371	10	0	3	1	0	3.08	15	poor	4	much of weir underwater

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## Appendix C9.–Page 5 of 5.

Date	Chinook salmon					Coho salmon					Northern pike	River water			Boats through weir	General comments	
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>	Sockeye salmon	Chum salmon		Pink salmon	Stage (ft)	Temp. (°C)	Clarity (relative)		(no.)
19 Aug	1	39,988				41	16,412		0	1	0	0	2.95	15.0	poor	3	weir fish tight and floating again at 6 PM
20 Aug	9	39,997				53	16,465	10	0	9	6	0	2.38	15.0	poor	1	
21 Aug	9	40,006				45	16,510		1	4	13	0	1.90	15.0	poor	3	
22 Aug	7	40,013				64	16,574		0	3	13	0	1.64	15.0	poor	5	
23 Aug	3	40,016				33	16,607	4	0	4	13	0	1.48	14.0	poor	4	
24 Aug	10	40,026				76	16,683		0	0	25	0	1.28	14.0	poor	4	
25 Aug	3	40,029				21	16,704	1	0	5	4	0	1.18	14.0	fair	2	
26 Aug	5	40,034				116	16,820	19	0	10	16	0	1.32	13.5	poor	0	
27 Aug	4	40,038				73	16,893		0	0	1	0	2.88	12.5	poor		
28 Aug	2	40,040				51	16,944		1	1	0	0	2.89	12.0	poor	0	
29 Aug	6	40,046				36	16,980		1	5	0	0	2.30	12.0	poor	3	water rising  1 RBT  weir pulled
30 Aug	7	40,053				66	17,046	8	0	4	0	0	1.88	13.0	poor	4	
31 Aug	3	40,056				14	17,060		0	2	0	0	1.66	13.0	poor	1	
1 Sep	4	40,060				55	17,115	5	0	2	1	0	1.64	13.0	poor	2	
2 Sep	2	40,062				18	17,133		0	2	1	0	1.86	13.0	poor	3	
3 Sep	1	40,063				17	17,150		0	0	0	0	1.60	13.0	poor	1	
4 Sep	1	40,064				57	17,207		0	1	5	0	1.56	13.0	poor	2	
5 Sep	0	40,064				39	17,246	3	0	2	0	0	2.00	11.0	poor	5	
6 Sep	2	40,066				23	17,269		1	0	1	0	2.46	12.0	poor	4	
7 Sep	1	40,067				19	17,288		1	2	0	0	1.64	10.0	poor	8	
8 Sep	2	40,069				17	17,305		0	2	0	0	1.40	11.0	fair	2	
Totals		40,069	560	44%	245		17,305	421	80	152	9,214	27					

Appendix C10.–Deshka River weir passage data for 2004.

Date	Chinook salmon					Coho salmon							River water			Boats thru weir	General comments
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>	Sockeye salmon	Chum salmon	Pink salmon	Northern pike	Stage (ft)	Temp. (°C)	Clarity <sup>a</sup> (cm)	(no.)	
20 May																	weir installed
21 May	48	48											1.40	14	>120	10	weir fish tight @ 11:00 AM
22 May	101	149											1.30	14	>120	14	fair visibility
23 May	142	291											1.16	15	>120	4	fair visibility
24 May	226	517	3	33%	1								1.16	15	120+	0	
25 May	159	676	0										1.32	14	120+	0	
26 May	62	738	10	70%	7								1.36	14	120+	8	
27 May	204	942	3	33%	1								1.32	14	70	4	1 raft
28 May	84	1,026	10	50%	5								1.27	14	120	11	
29 May	312	1,338	5	40%	2								1.41	14	120	19	
30 May	206	1,544	4	50%	2								1.30	14	105	22	
31 May	273	1,817	4	75%	3								1.13	15	107	6	1 raft
1 Jun	293	2,110	5	40%	2								1.08	15	120	3	
2 Jun	405	2,515	0		0								1.01	15	120+	13	
3 Jun	441	2,956	10	50%	5							4	0.93	15	120+.	13	
4 Jun	629	3,585	4	50%	2							0	0.90	15	120+	17	4 rafts
5 Jun	362	3,947	5	80%	4							0	0.82	17	120	23	52 interviews
6 Jun	247	4,194	4	75%	3							0	0.72	19	120	11	
7 Jun	461	4,655	7	57%	4							0	0.67	19	120+	9	
8 Jun	1,667	6,322	24	58%	14							1	0.60	17	120+	10	1 burbot
9 Jun	2,373	8,695	30	67%	20							0	0.56	16	120+	11	
10 Jun	1,052	9,747	10	60%	6							0	0.54	16	120+	10	
11 Jun	3,759	13,506	30	57%	17							0	0.55	13	120+	19	1 dead humpback whitefish
12 Jun	2,467	15,973	20	75%	15							0	0.49	14	120	22	5 rafts, 2 dead humpback whitefish on weir

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Appendix C10.–Page 2 of 5.

Date	Chinook salmon					Coho salmon			Sockeye salmon	Chum salmon	Pink salmon	Northern pike	River water			Boats thru weir (no.)	General comments
	Daily count	Cum.	n	Fem %	Fem no.	Daily count	Cum.	n					Stage (ft)	Temp. (°C)	Clarity <sup>a</sup> (cm)		
13 Jun	2,305	18,278	30	73%	22							0	0.49	15	120+	13	4 rafts, 2 dead humpback whitefish on weir
14 Jun	2,288	20,566	40	45%	18							0	0.43	16	120+	9	4 rafts
15 Jun	3,626	24,192	30	43%	13							0	0.39	18	120+	12	2771 passed in AM (started 4 AM), 2 dead humpback whitefish on weir
16 Jun	2,082	26,274	30	47%	14							0	0.38	17	120+	8	1210 passed in AM (started 4 AM)
17 Jun	4,433	30,707	40	70%	28							1	0.49	17	120+	8	1710 passed in AM (started 4 AM)
18 Jun	3,068	33,775	40	50%	20							1	0.85	17	120+	25	2000 passed in AM
19 Jun	3,114	36,889	30	43%	13							0	0.93	19	120+	19	10 rafts
20 Jun	1,347	38,236	20	30%	6							0	0.70	21	120+	12	4 rafts
21 Jun	1,136	39,372	20	75%	15							1	0.56	20.5	120+	12	4 rafts
22 Jun	702	40,074	10	70%	7							0	0.43	21	120+	8	1 raft
23 Jun	211	40,285	3	67%	2							2	0.36	21	120+	12	2 rafts
24 Jun	253	40,538	5	40%	2							0	0.30	21	120+	9	4 rafts
25 Jun	368	40,906	5	60%	3							0	0.27	21	120+	12	
26 Jun	97	41,003	0		0							3	0.20	20	120+	7	
27 Jun	66	41,069	0		0							5	0.17	22	120+	11	
28 Jun	61	41,130	0		0							1	0.12	22	120+	3	3 brown bear cubs crossed far side
29 Jun	49	41,179	4	100%	4							1	0.80	21	120+	2	
30 Jun	653	41,832	4	50%	2							2	0.12	20	120+	2	
1 Jul	1,017	42,849	10	40%	4							0	0.12	19	120+	4	900 fish this morning, 3 rafts

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Date	Chinook salmon					Coho salmon					River water			Boats thru weir (no.)	General comments		
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>	Sockeye salmon	Chum salmon	Pink salmon	Northern pike	Stage (ft)			Temp. (°C)	Clarity <sup>a</sup> (cm)
2 Jul	3,602	46,451	45	42%	19						1	0	0.13	18	120+	11	1500 fish in AM
3 Jul	1,250	47,701	16	50%	8	7	7				1	0	0.12	18	120+	6	
4 Jul	1,612	49,313	20	65%	13	10	17				0	0	0.20	19	120+	2	
5 Jul	2,429	51,742	25	64%	16	19	36				3	0	0.18	18.5	120+	4	
6 Jul	125	51,867	1	0%	0	1	37				1	0	0.18	19	120+	0	1000 this morning, lots of fish below
7 Jul	1,421	53,288	15	47%	7	15	52			1	2	0	0.10	21	120+	5	
8 Jul	777	54,065	10	60%	6	2	54			0	0	0	0.04	21	120+	5	
9 Jul	363	54,428	5	40%	2	1	55			0	0	0	0.01	21	120+	8	
10 Jul	0	54,428	0		0	0	55			0	0	0	-0.02	21	120+	7	
11 Jul	6	54,434	0		0	0	55			0	0	0	-0.05	21	120+	2	
12 Jul	12	54,446	0		0	1	56			0	0	0	-0.04	23	120+	2	sow & cubs, cow with calves
13 Jul	51	54,497	0		0	5	61			0	3	0	-0.09	23	120+	2	
14 Jul	19	54,516	0		0	3	64			0	2	0	-0.10	23	120+	2	
15 Jul	33	54,549	0		0	2	66			0	3	0	-0.12	23	120+	3	plus 2 rafts
16 Jul	56	54,605	0		0	2	68		1	0	34	0	-0.03	21	120+	4	
17 Jul	207	54,812	4	50%	2	8	76		3	0	2,512	0	-0.03	22	120+		
18 Jul	120	54,932	1	100%	1	42	118	3	32	0	10,637	0	-0.03	23	120+	1	
19 Jul	96	55,028				63	181	1	8	0	6,744	0	-0.03	21	120+	0	
20 Jul	211	55,239				44	225	0	11	0	7,677	0	-0.03	21	120+	1	
21 Jul	51	55,290				30	255	1	7	0	7,867	0	-0.03	20	120+	4	
22 Jul	111	55,401				83	338	1	4	0	8,841	0	-0.03	21	120+	2	
23 Jul	70	55,471				59	397	1	1	0	5,463	0	-0.03	19.5	120+	6	
24 Jul	162	55,633				65	462	1	13	0	18,435	0	-0.03	19.5	120+	4	
25 Jul	99	55,732				164	626	4	23	0	31,118	0	-0.05	19	120+	1	
26 Jul	134	55,866				249	875	6	8	0	32,542	0	-0.03	18.5	120+	0	

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## Appendix C10.–Page 4 of 5.

	Chinook salmon					Coho salmon					Northern pike	River water			Boats thru weir (no.)	General comments
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>	Sockeye salmon	Chum salmon	Pink salmon	Stage (ft)	Temp. (°C)	Clarity <sup>a</sup> (cm)		
27 Jul	33	55,899				506	1,381	13	6	0	40,291	0	-0.01	17.5	120+	2
28 Jul	64	55,963				1,771	3,152	40	1	0	38,317	0	0.00	17.5	120+	6
29 Jul	32	55,995				1,121	4,273	30	2	0	27,841	0	0.00	17.5	120+	4
30 Jul	82	56,077				1,165	5,438	30	3	0	21,318	0	-0.10	17.5	120+	23
31 Jul	42	56,119				914	6,352	20	4	0	18,419	0	-0.15	17	120+	10
1 Aug	37	56,156				1,060	7,412	20	5	1	31,074	1	-0.26	16.5	120+	5
2 Aug	14	56,170				533	7,945	12	0	0	14,124	0	-0.32	16	120+	8
3 Aug	26	56,196				576	8,521	10	2	1	16,586	0	-0.36	16	120+	3
4 Aug	25	56,221				318	8,839	10	2	0	7,661	0	-0.36	16	120+	4
5 Aug	14	56,235				147	8,986	5	0	0	4,269	0	-0.36	16.5	120+	4
6 Aug	49	56,284				57	9,043	4	0	0	2,258	1	-0.36	17.5	120+	5
7 Aug	3	56,287				125	9,168	2	0	0	2,631	0	-0.38	18.5	120+	5
8 Aug	29	56,316				27	9,195	2	3	0	4,721	0	-0.38	18	120+	5
9 Aug	16	56,332				39	9,234	3	2	0	5,563	0	-0.38	18	120+	3
10 Aug	30	56,362				20	9,254	4	3	0	4,158	0	-0.38	18	120+	4
11 Aug	68	56,430				53	9,307	0	1	0	3,261	0	-0.39	18	120+	2
12 Aug	57	56,487				40	9,347	0	2	0	3,172	0	-0.35	17.5	120+	4
13 Aug	32	56,519				13	9,360	0	5	0	2,345	0	-0.34	16.5	120+	1
14 Aug	62	56,581				11	9,371	2	2	0	2,424	1	-0.32	16.5	120+	1
15 Aug	103	56,684				36	9,407	0	5	0	2,031	0	-0.34	16.5	120+	4
16 Aug	71	56,755				86	9,493	5	4	0	1,383	0	-0.38	16.5	120+	1
17 Aug	153	56,908				1,009	10,502	40	4	1	1,192	0	-0.42	16.5	120+	2
18 Aug	159	57,067				611	11,113	40	1	0	501	0	-0.44	16.5	120+	3
19 Aug	202	57,269				282	11,395	18	3	0	305	0	-0.43	16.5	120+	2
20 Aug	109	57,378				184	11,579	12	2	0	347	0	-0.43	16.5	120+	6
21 Aug	235	57,613				5,351	16,930	40	13	0	656	0	-0.26	16	120+	3
22 Aug	126	57,739				2,259	19,189	40	0	0	364	0	-0.19	16	120+	1

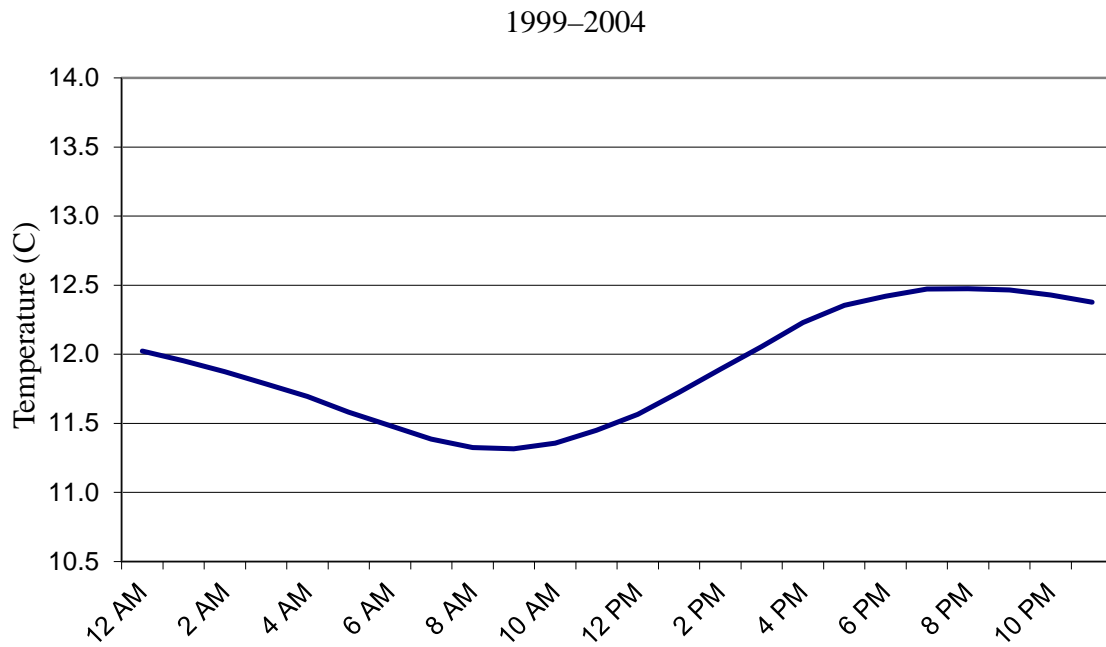
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## Appendix C10.–Page 5 of 5.

	Chinook salmon					Coho salmon					River water			Boats thru weir	General comments		
	Daily count	Cum.	<i>n</i>	Fem %	Fem no.	Daily count	Cum.	<i>n</i>	Sockeye salmon	Chum salmon	Pink salmon	Northern pike	Stage (ft)			Temp. (°C)	Clarity <sup>a</sup> (cm)
Date																	
23 Aug	36	57,775				1,776	20,965	30	2	1	177	0	-0.24	16.0	120+	2	10 floaters
24 Aug	39	57,814				1,086	22,051	16	1	0	107	0	-0.27	16.0	120+	3	
25 Aug	41	57,855				8,659	30,710	30	2	0	163	0	-0.26	16.0	120+	1	most fish in PM. Lightning storm and downpour in PM
26 Aug	27	57,882				21,824	52,534	40	5	2	156	0	-0.19	16.0	120+	3	11,000 coho by 9 am
27 Aug	10	57,892				7,344	59,878	40	0	1	176	0	0.95	13.0	45	4	6,000 by 16:30
28 Aug	7	57,899				1,309	61,187	30	0	0	78	0	1.12	13.0	45	5	
29 Aug	10	57,909				661	61,848	18	0	1	48	0	1.30	13.0	45	3	
30 Aug	13	57,922				324	62,172	6	0	4	19	0	1.04	13.0	80	3	
31 Aug	5	57,927				195	62,367	6	1	1	15	2	0.80	12.5	120+	0	
1 Sep	2	57,929				120	62,487	4	0	0	24	0	0.68	12.5	120+	3	
2 Sep	1	57,930				139	62,626		0	0	14	2	0.62	12.0	120+	1	
3 Sep	2	57,932				98	62,724		0	2	6	0	0.70	12.0	120+	6	
4 Sep	1	57,933				57	62,781		1	1	2	0	0.67	9.5	120+	10	1 raft
5 Sep	0	57,933				64	62,845		1	2	2	0	0.56	9.5	120+	2	
6 Sep	1	57,934				38	62,883		0	1	1	0	0.47	9.0	120+	0	
7 Sep	0	57,934				39	62,922		1	0	1	0	0.41	9.0	120+	2	3 rafts
8 Sep	0	57,934				18	62,940		0	1	0	0	0.36	8.5	120+	3	
9 Sep																	pulled weir, 3 dead humpback whitefish on weir, sampled 2
Totals		57,934	651	55%	360		62,940	640	200	21	390,087	29					

<sup>a</sup> Secchi tube (cm).

**APPENDIX D: AVERAGE HOURLY WATER  
TEMPERATURES FOR 15 MAY–15 JUNE, 1999–2004**

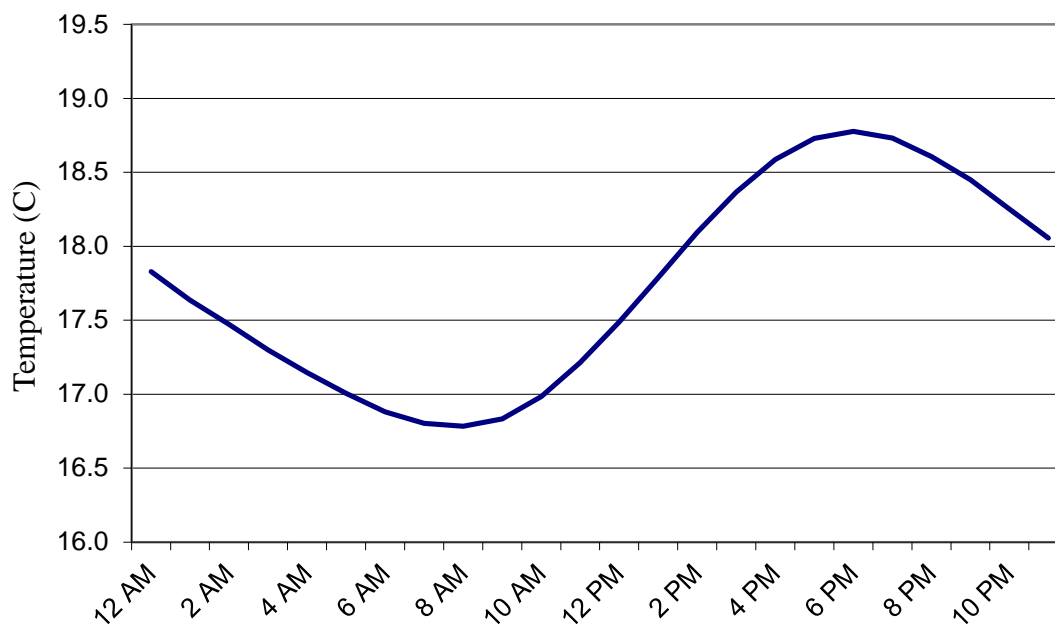


*Note:* average daily range from 15 May to 15 June was 7–17°C, a difference of 10°C. Rate of increase was about 0.3°C/day during this time period (see Figure 4).

Appendix D1.—Average hourly water temperature 15 May–15 June, 1999–2004, as measured by an Optic StowAway temperature logger attached to the weir rail at RKM 11.



### 1999–2004



*Note:* average daily range from 15 June to 15 July was 17.0–18.5°C, a difference of 1.5°C. Temperatures fluctuated during this time period (see Figure 4).

Appendix D2.—Average hourly water temperature 15 June–15 July, 1999–2004, as measured by an Optic StowAway temperature logger attached to the weir rail at RKM 11.



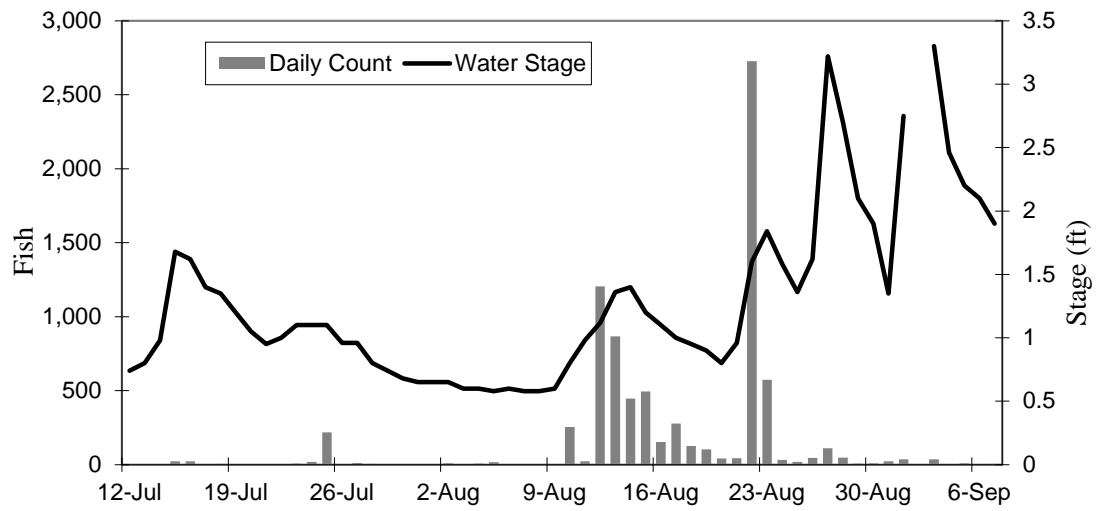
## **APPENDIX E: DATA USED IN SIMPLE LINEAR REGRESSION (FIGURE 8)**

Appendix E1.—Data used in simple linear regression (Figure 8).

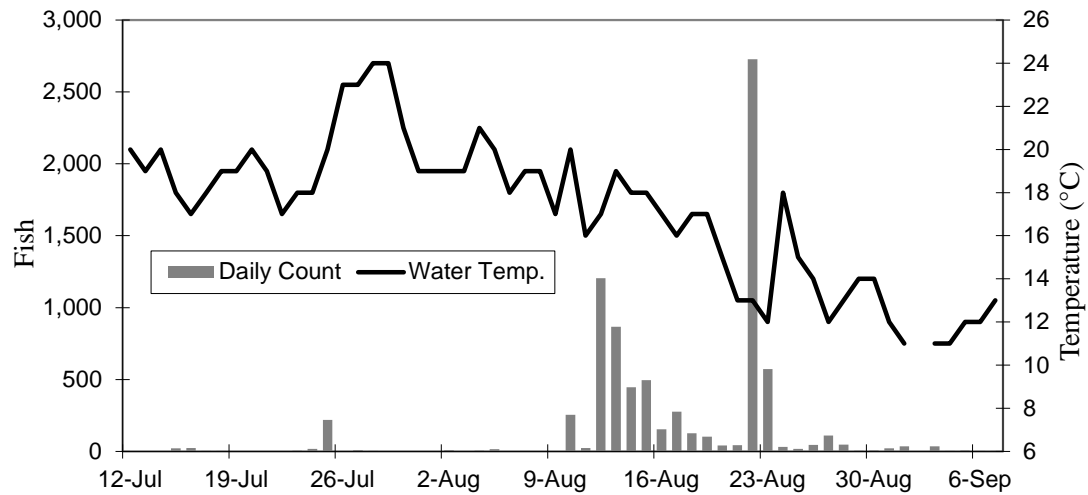
Year	Aerial index	Weir count	Harvest above weir	Estimated Escapement
1995	5,150	10,048	<sup>a</sup>	10,048
1996	6,343	14,349	<sup>a</sup>	14,349
1997	19,047	35,587	<sup>a</sup>	35,587
1999	12,904	29,649	561	29,088
2002	8,749	29,428	893	28,535
2004	28,778	57,934	<sup>a</sup>	57,934

<sup>a</sup> Harvest not available.

**APPENDIX F: DAILY COHO SALMON COUNTS VS.  
WATER STAGE AND TEMPERATURE DURING YEARS  
WHEN COMPLETE COUNTS WERE RECORDED**

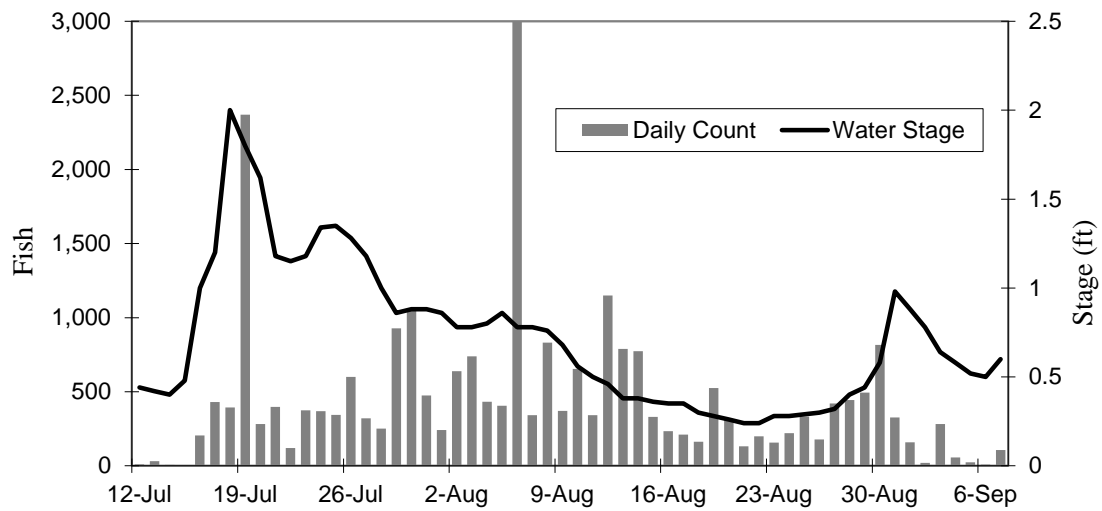


**1997 Daily Coho Counts vs. Stage**

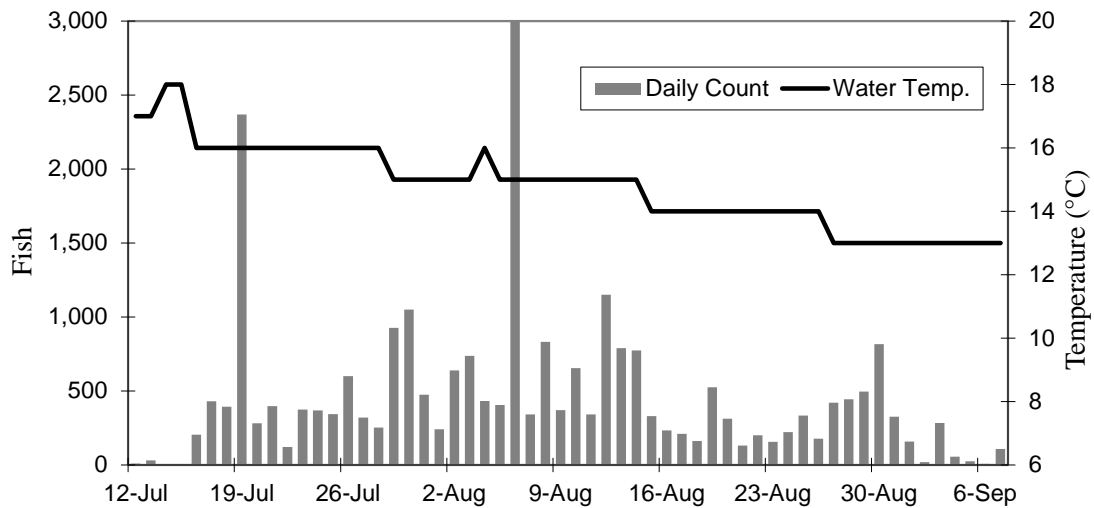


**1997 Daily Coho Counts vs. Water Temperature**

Appendix F1.—Daily coho salmon counts vs. water stage (top) and temperature (bottom) as measured at the Deshka River weir during 1997.

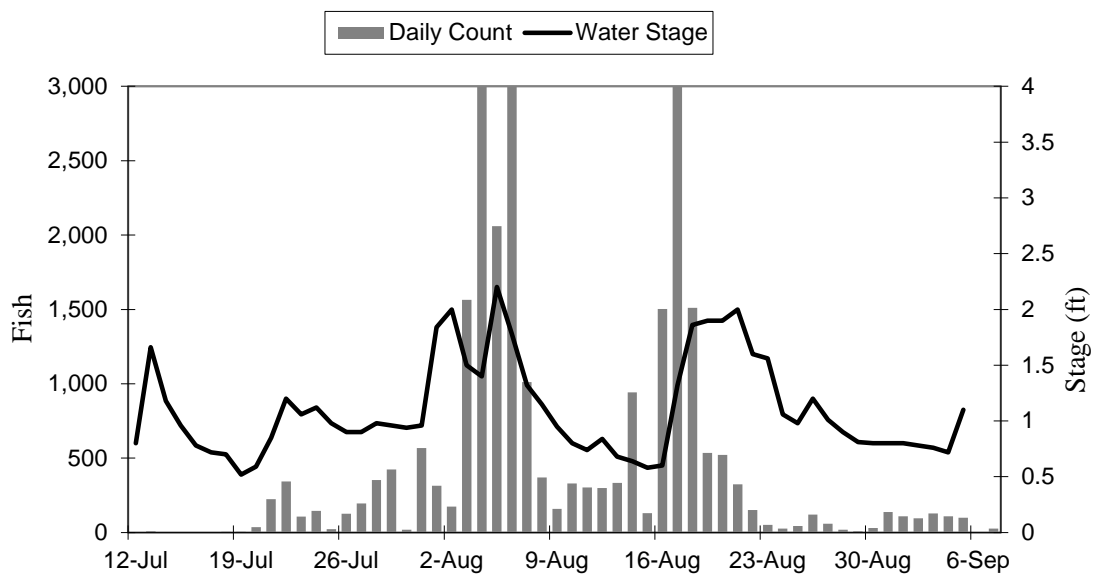


**2000 Daily Coho Counts vs. Stage**

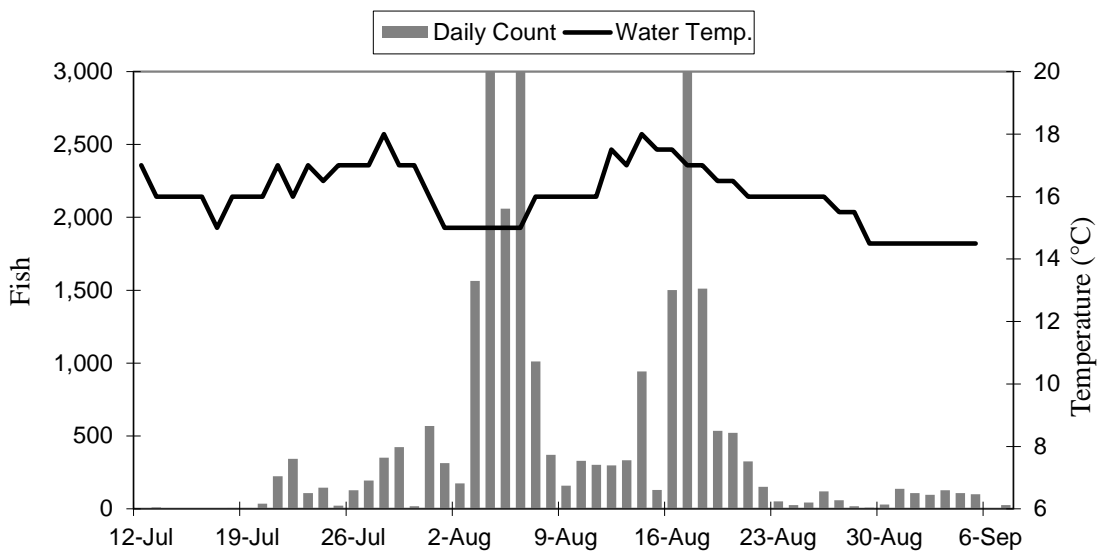


**2000 Daily Coho Counts vs. Water Temperature**

Appendix F2.—Daily coho salmon counts vs. water stage (top) and temperature (bottom) as measured at the Deshka River weir during 2000.



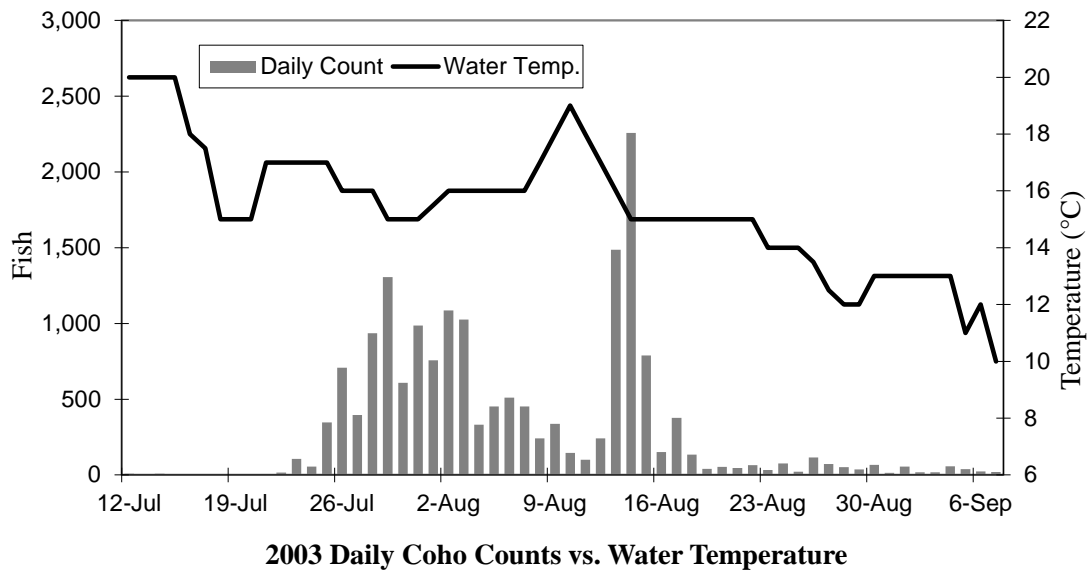
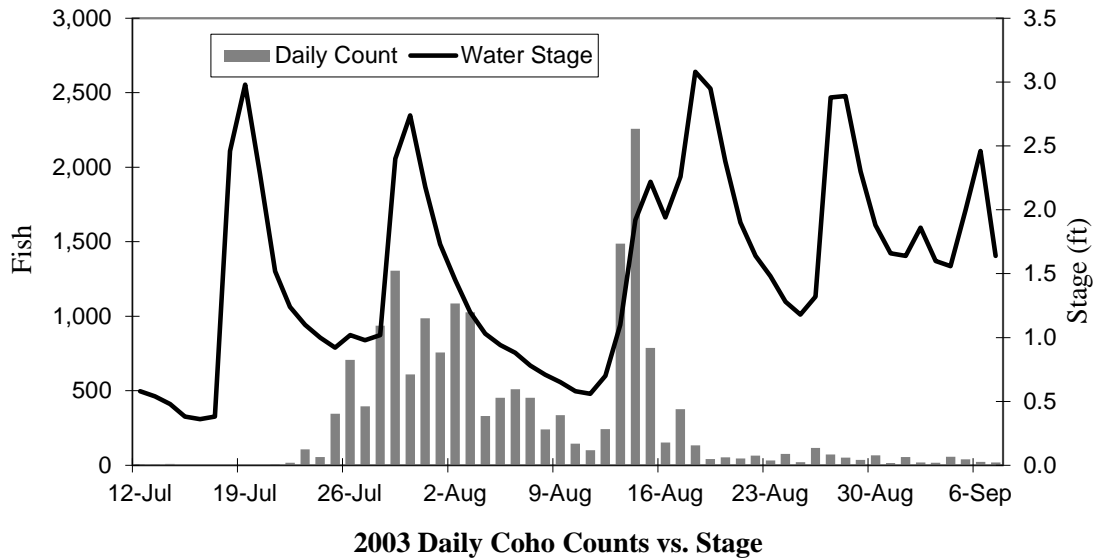
**2001 Daily Coho Counts vs. Stage**



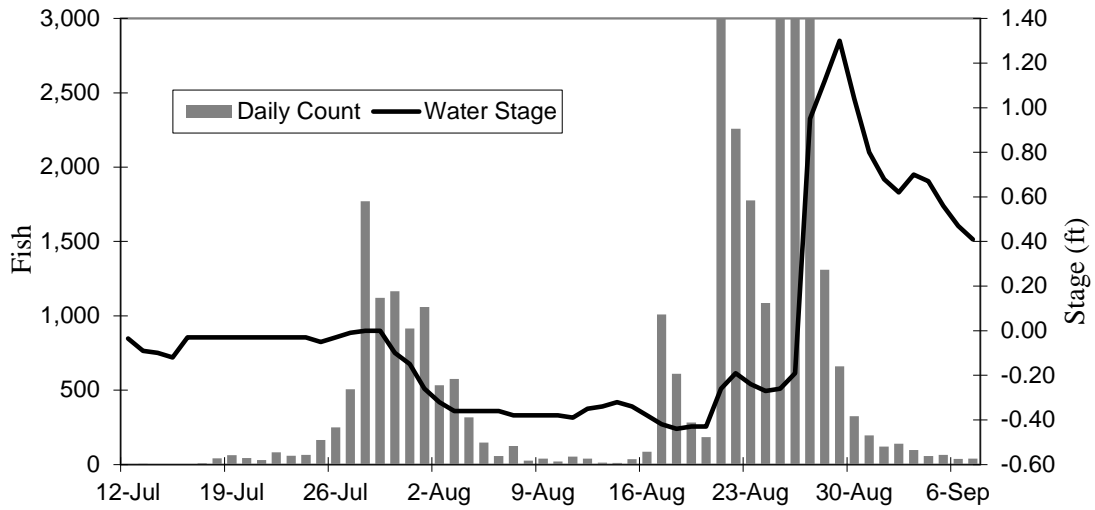
**2001 Daily Coho Counts vs. Water Temperature**

Appendix F3.—Daily coho salmon counts vs. water stage (top) and temperature (bottom) as measured at the Deshka River weir during 2001.

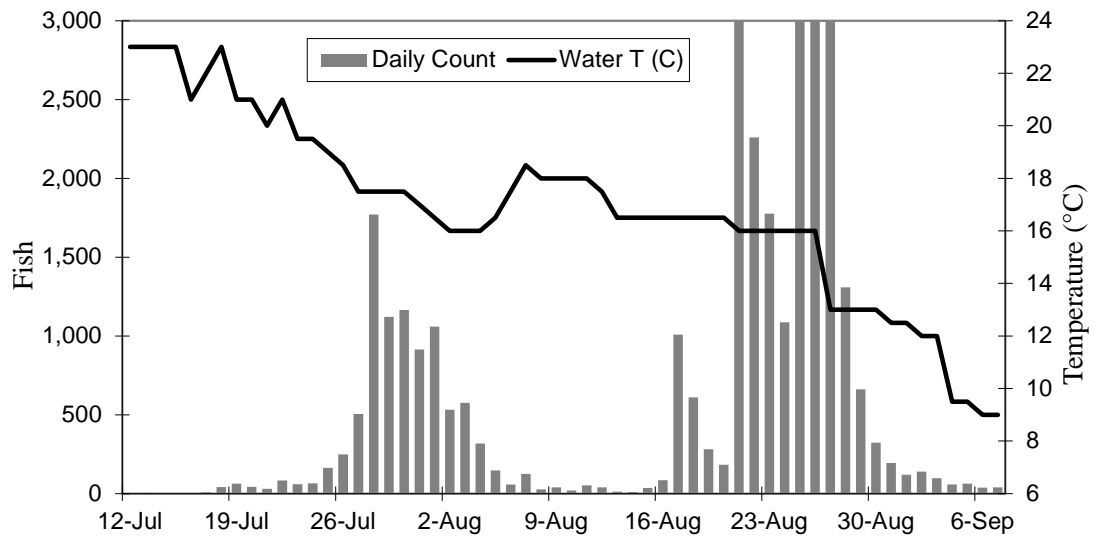




Appendix F4.—Daily coho salmon counts vs. water stage (top) and temperature (bottom) as measured at the Deshka River weir during 2003.



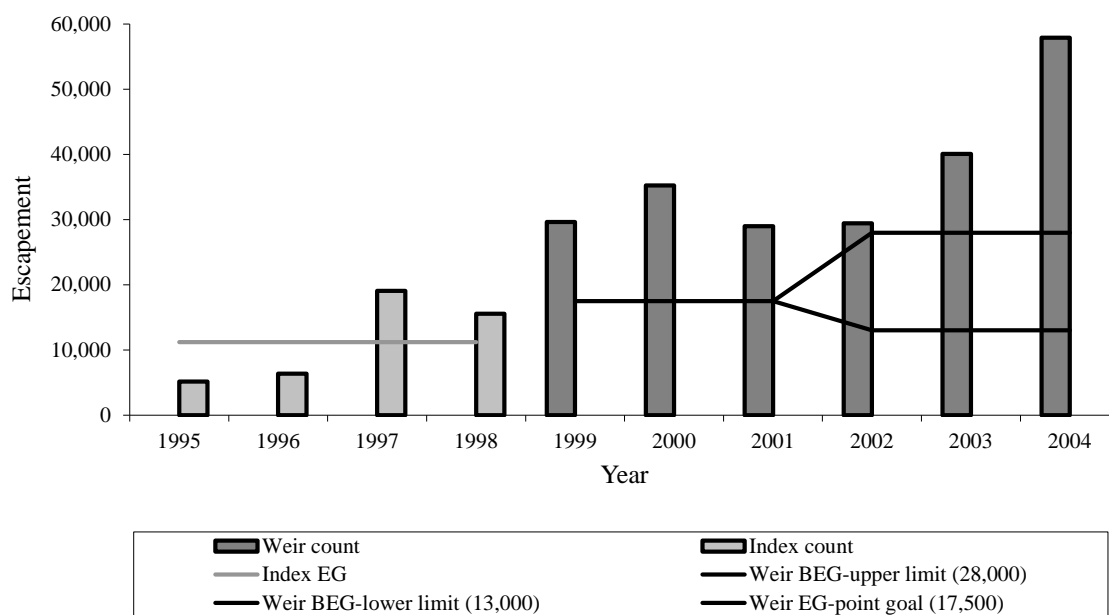
**2004 Daily Coho Counts vs. Stage**



**2004 Daily Coho Counts vs. Water Temperature**

Appendix F5.—Daily coho salmon counts vs. water stage (top) and temperature (bottom) as measured at the Deshka River weir during 2004.

**APPENDIX G: INDEX AND WEIR COUNTS WITH  
ASSOCIATED ESCAPEMENT GOALS FOR CHINOOK  
SALMON**

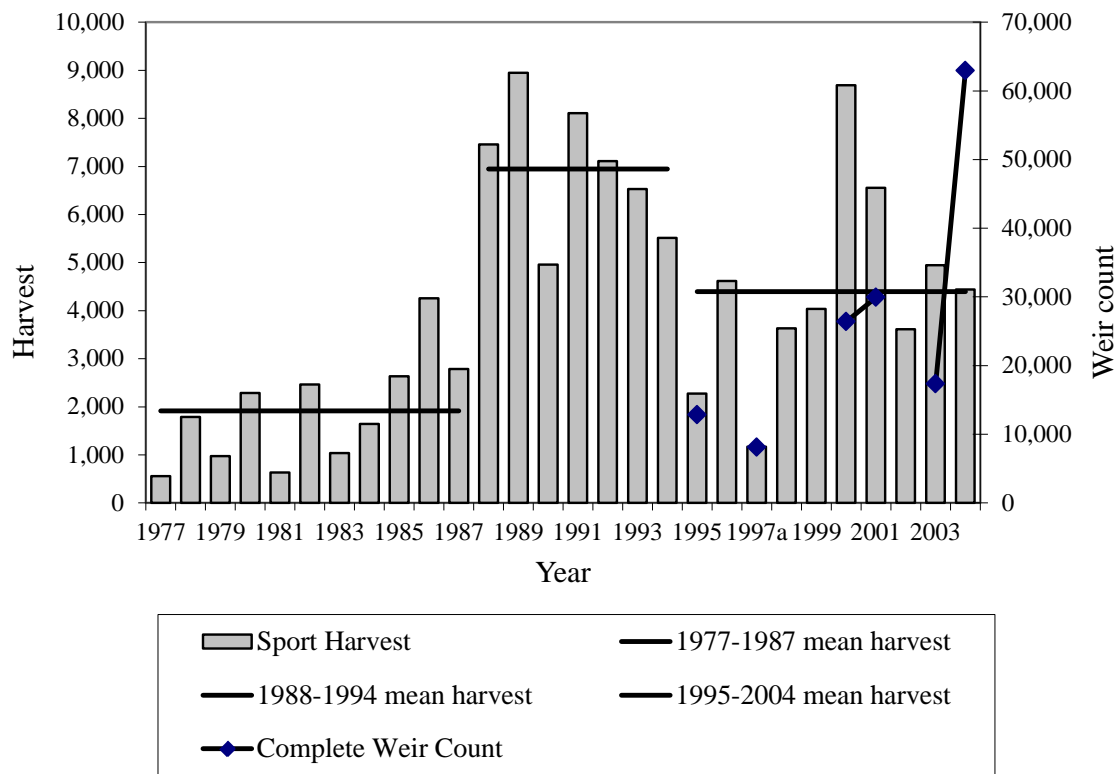


*Aerial index count sources:* Whitmore and Sweet 1997-1999.

*Weir count source:* I:SF/INSEASON at Alaska Department of Fish and Game, Division of Sport Fish, Palmer, 1800 Glenn Hwy, Suite 4, Palmer, Alaska.

Appendix G1.—Index and weir counts with associated escapement goals for Chinook salmon monitored on the Deshka River, 1995–2004.

## **APPENDIX H: DESHKA RIVER COHO SALMON SPORT HARVEST AND WEIR COUNTS**



Source: Mills 1979–1980, 1981a–b, 1982–1994; Howe et al. 1995, 1996, 2001a–d; Walker et al. 2003; Jennings et al. 2004, 2006a–b, 2007.

Appendix H1.—Trends in the Deshka River coho salmon sport harvests (1977–2004) and weir counts (1995–2004).

Appendix H2.–Deshka River coho salmon sport harvests (1977–2004) and weir counts (1995–2004).

Year	Harvest	Weir Count
1977	559	
1978	1,789	
1979	973	
1980	2,290	
1981	632	
1982	2,463	
1983	1,036	
1984	1,646	
1985	2,637	
1986	4,256	
1987	2,789	
1988	7,458	
1989	8,947	
1990	4,959	
1991	8,111	
1992	7,110	
1993	6,530	
1994	5,511	
1995	2,275	12,824
1996	4,615	1,394 <sup>c</sup>
1997 <sup>a</sup>	1,169	8,063
1998	3,630	6,773 <sup>c</sup>
1999	4,034	4,566 <sup>c</sup>
2000 <sup>b</sup>	8,687	26,387
2001	6,556	29,927
2002	3,616	24,612 <sup>c</sup>
2003	4,946	17,305
2004	4,440	62,940
Mean	4,059	26,241 <sup>d</sup>

*Source:* Mills 1979–1980, 1981a-b, 1982–1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007.

<sup>a</sup> Bag and possession limit reduced from 3 per day and 6 in possession to 1 per day and 1 in possession, by emergency order on 9 August 1997.

<sup>b</sup> Adoption of the Coho Conservation Plan reduced bag and possession limits from 3 per day and 6 in possession to 2 per day and 4 in possession by regulation.

<sup>c</sup> Incomplete weir count due to flooding.

<sup>d</sup> Complete count years only.